

Preparation for Implementing a Decision

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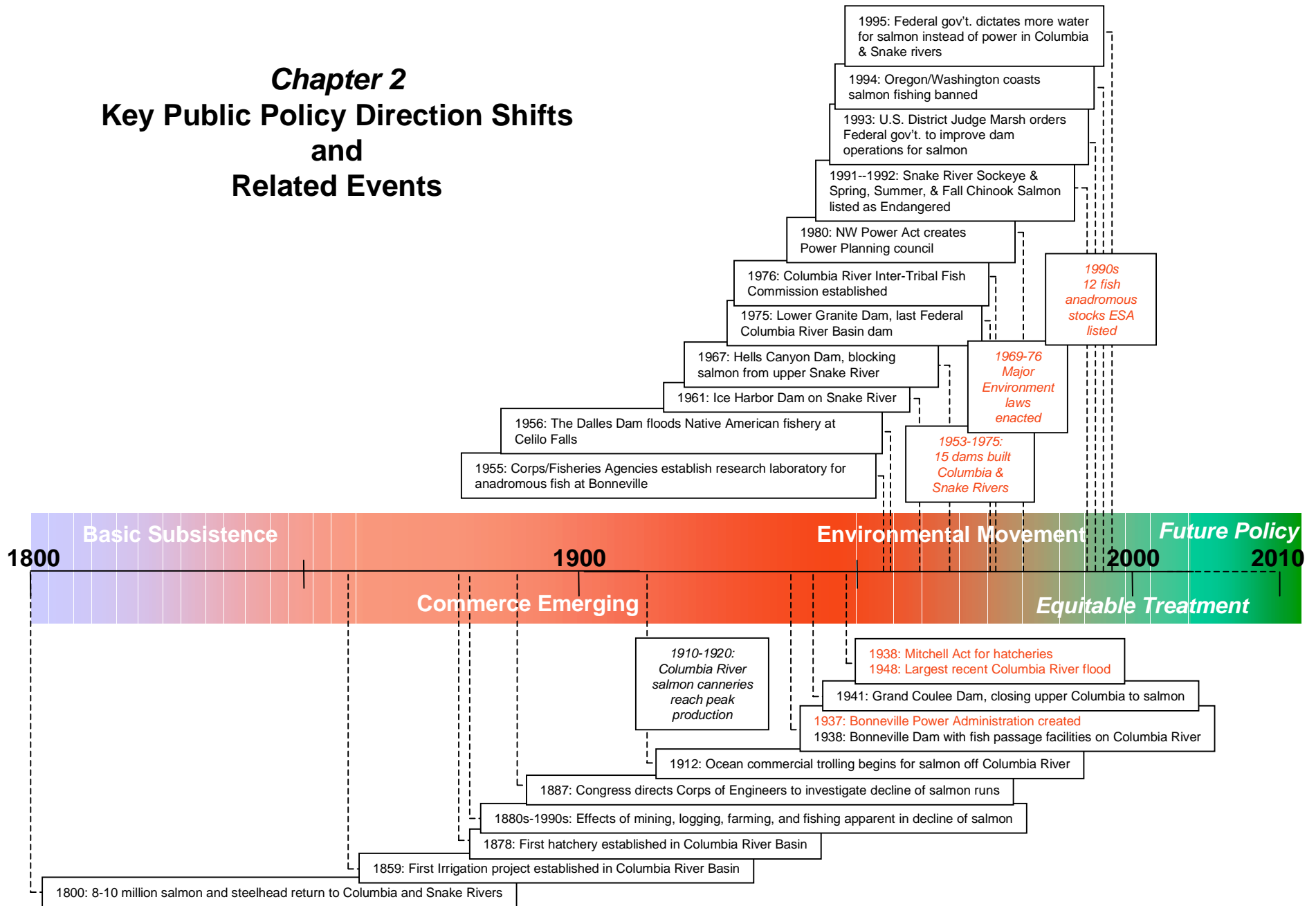
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CHAPTER 2: POLICY HISTORY AND AFFECTED ENVIRONMENT

- **Describes those aspects of the human environment** that will or may be affected by changes in **Policy Direction** for fish and wildlife mitigation and recovery efforts.
- **Describes the evolution of fish and wildlife policy over time, through**
 - Basic Subsistence,
 - Land Claims and Commercial Development,
 - Federal Intervention, and
 - The Period of Statutory "Equitable Treatment."
- **Provides a "snapshot" of where we are today (circa 2001)** in terms of the following:
 - state of the current policy(ies) to support fish and wildlife recovery efforts,
 - potential modifying policy initiatives, and
 - existing environmental conditions.

This chapter focuses on describing historical and recent policy-level decisions that have affected fish and wildlife populations throughout the region. Then, the consequences of these decisions are described in terms of their effects on the human environment.

2.1 INTRODUCTION

We may be accustomed to thinking of public policy as long, formal documents developed by an anonymous group of government officials. However, public policy—principles that guide and shape decisionmaking by a controlling authority—is as old as civilization.

To understand the issues and to make sound decisions on a future **Policy Direction** for the recovery and mitigation efforts regarding fish and wildlife populations in the region, decisionmakers must understand three things:

- where we have been,
- where we are now, and
- what policy options are available for the future.

This chapter offers an overview of how policy regarding fish and wildlife has developed over the centuries, up to and including today.

In reading these sections, please keep in mind that we have worked to report data as objectively as possible. However, we recognize that history, like so many issues, can be

a matter of interpretation. Therefore, the analytical focus of this chapter is on what's been done, *not* on who did it. In this way, we can learn from past decisions and develop the best choices for the future.

2.2 BPA SERVICE TERRITORY AND COLUMBIA RIVER BASIN

This section provides a brief description of the potentially affected human environment in the Columbia River Basin, including elements of land, water, air, fish, wildlife, vegetation, and peoples. Section 2.4 provides a more detailed description of existing conditions.

2.2.1 Natural Environment

The **Columbia River** watershed and BPA's service territory generally coincide with the boundaries of the Pacific Northwest states (see Figure 2-1). The river, which begins in Canada, is often used to define the Pacific Northwest region and is cited as the outstanding natural resource of the region. Many tributaries feed the Columbia. The largest of these—the Snake River—drains more than 40% of the surface area of the Columbia Basin, and supplies about 20% of the Columbia's flow. Most of the Snake River Basin lies in southern Idaho and the easternmost part of Oregon, a dry region whose development has depended almost totally on water availability. A lesser part of the basin drains western Wyoming and small pockets of northern Utah and Nevada. Other streams drain Central Idaho and a portion of Montana west of the Rockies.

The Pacific Northwest environment is highly complex, principally because of the ocean and mountains. Climate close to the coast is strongly influenced by the Pacific Ocean. At lower elevations west of the Olympic Mountains and the Coast Range, temperatures remain consistently mild and summer fog reduces moisture stress during an otherwise dry season. Dense, moist forests of primarily western hemlock and Douglas-fir predominate west of the Cascades. Cool, wet winters; warm, dry summers; and rich soils promote fast and prolonged vegetation growth.

East of the Cascades, increased aridity and frequent fires promote open, park-like stands of ponderosa pine, lodgepole pine, and western larch in mountainous areas and juniper woodlands, sagebrush-steppe, and grasslands at lower elevations. The Klamath Mountains ecoregion supports a diverse mixture of drought-resistant conifers and hardwoods, a result of lower precipitation and a complex geological and ecological history. In addition, the lowland river valleys of western Oregon and Washington support extensive oak woodlands, grasslands, and wetlands composed of herbaceous plants.

Although conifers predominate in many areas, the region also includes large areas of temperate and semi-arid grass- and brush lands. Rainshadow effects of the mountains cause aridity and temperatures to increase progressively farther inland, especially east of the Cascade Range. The warmest and driest habitats in this region occur at low

elevations in the Snake River Basin - High Desert region. Here, semi-arid deserts of sagebrush and grasses dominate the landscape.

There is substantial variation in weather from year to year. The amount of precipitation especially varies, depending on ocean conditions, and annual precipitation amounts in some locations can vary by an order of magnitude.

The Columbia River and its tributaries are home to a variety of native salmonid and non-salmonid fish. Rivers and streams support a large number of anadromous fish species (species that migrate down river to the ocean to mature, then return upstream to spawn), as well as varied populations of resident fish (fish that live their entire lives in fresh water). A number of fish and wildlife species are listed as threatened or endangered under the ESA or as sensitive (special designations by the U.S. Forest Service [USFS] or the Bureau of Land Management [BLM] for species in decline).¹ Listed fish species includes some runs of coho, chinook, chum sockeye, and steelhead salmonids, and sea-run cutthroat trout, the Kootenai River White Sturgeon, and bull trout. Bird species currently listed as threatened or endangered include the bald eagle, spotted owl, and marbled murrelet. Listed mammals include the Canadian lynx, woodland caribou, grizzly bear, Columbian white-tailed deer, and gray wolf.²

2.2.2 Human Population

It is not known exactly when Native Americans began to inhabit the continent of North America. However, their settlements occurred widely across the Pacific Northwest, shaped in many cases by the natural resources that supported their lives—fish, forest-, or plains-dwelling animals; water for drinking, fishing, or transportation; forests and plant materials. Each tribe developed its own unique cultural adaptations. When European explorers (and later settlers) came to the Columbia Basin, they found a relatively stable balance of abundant resources that had readily supported growing tribal populations for thousands of years.

Euro-Americans settled and developed the West generally in response to two factors:

- the presence of ample natural resources; and
- the evolution of federal land policies.

National and international demand shaped the economic development of the region, as natural resources were identified, obtained, and marketed by non-Indian settlers. First sought were sea and land fur-bearing animals. Next was land with favorable climate, ranging from cool and wet west of the Cascades to temperate and dry to the east. Gold and other minerals, timber, salmon, and, finally, the Columbia River itself were targeted for development. Those goals—and the methods used to pursue them—significantly

¹ Information from BPA Vegetation Management Program EIS (USDOE/BPA, 2000), p. 130. See **Appendix C** for a complete list of ESA-listed species.

² Information from USDOE/BPA (2000), p. 132.

changed the environment, and profoundly diminished both tribal well-being and tribal access to traditional natural resources.

2.3 POLICY EVOLUTION

The evolution of fish and wildlife public policy in the region—state, federal, and tribal—has affected and been affected by the human environment over time. The closer we get to the present, the more complex and inconsistent public policy has become. The discussion below summarizes that evolution. The first major section (2.3.1) summarizes the evolution of policy up to 1980 (the year of the passage of the Regional Act). The second section (2.3.2) focuses on policy from 1980 to the present. To begin, Table 2.3-1 captures a sampling of major relevant milestones in Columbia River History.

Table 2.3-1: A Timeline of Columbia River History

Date(s)	Events
1800	An estimated 8-10 million salmon and steelhead return annually to the Columbia and Snake rivers
1855-1868	Era of treaties with tribes, followed by movement to reservations
1859	First irrigation project established in Columbia River Basin
1878	First hatchery established in Columbia River Basin, located on Clackamas River
1880s-1890s	Effects of mining, logging, farming, and fishing become apparent in declining salmon runs
1887	Congress directs Corps to investigate causes of declining salmon runs
1880-1890	Columbia salmon fisheries landings and cannery pack reach peak production
1918-1937	Major beginning of wildlife protection laws such as Migratory Bird Treaty Act (1918), Migratory Bird Conservation Act (1929), Migratory Bird Hunting and Conservation Stamp Act (1934), Federal Aid in Wildlife Restoration Act (1937)
1935	Commercial fishwheels prohibited
1937	BPA created to market the power from the federal hydroelectric projects
1938	Corps completes Bonneville Dam with fish passage facilities on the Columbia River
1941	Bureau begins operating Grand Coulee Dam, closing Upper Columbia River Basin to salmon migration
1948	Mitchell Act hatcheries authorized by Congress to mitigate for the effects of declining fish populations on the fishing industry
1948	Vanport flood
1950	Commercial fishing seines, traps, set nets prohibited Federal Aid in Sport Fish Restoration Act enacted to provide federal aid to the states for management and restoration of fish having "material value in connection with sport or recreation in the marine and/or fresh waters of the United States"
1953-1975	15 federal dams built on the Columbia and Snake rivers
1955	Corps, in consultation with the fisheries agencies, establishes laboratory at Bonneville Dam for research on anadromous fish
1956	Native American fishery at Celilo Falls flooded by The Dalles Dam

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Date(s)	Events
1960	The Multiple Use Sustained Yield Act declares the purposes of the National Forest include outdoor recreation, range, timber, watershed, and fish and wildlife
1960s-1970s	Nitrogen supersaturation noted as an important source of salmon mortality, fish passage improvements added to dams
1961	Corps begins operating Ice Harbor Dam on Snake River
1964	The Wilderness Act establishes the National Wilderness Preservation System, designating natural areas for preservation and protection before they became occupied or modified
1965	Last summer chinook commercial fishing season
1967	Idaho Power Company completes Hells Canyon Dam, blocking salmon from Upper Snake River
1968	<i>US v. Oregon</i> treaty fishing rights case filed in federal district court
1969-1976	Major development of broad-based environmental laws such as the National Environmental Policy Act (1969), Clean Water Act (1972), and Endangered Species Act (1973)
1975	Corps begins operating Lower Granite Dam, Columbia River Basin's last federally authorized and constructed dam
1976	Columbia River Inter-Tribal Fish Commission (CRITFC) established
1977	Last major spring chinook commercial fishing season until 2000
1980	Congress creates Northwest Power Planning Council
1991 – 1992	NMFS lists Snake River Sockeye as endangered and Snake River Spring, Summer, and Fall Chinook as threatened, later changed to endangered
1991-1996	12 species of anadromous fish stocks listed under ESA
1994	U.S. District Judge Malcolm F. Marsh orders federal government to improve dam operations, lessening their hazards to salmon
1994	Ocean salmon fishing banned for first time off northern Oregon and Washington coasts

2.3.1 Historical Perspective: Policy Evolution from Euro-American Settlement of the West to 1980

Over the past two hundred years, the human environment of the Pacific Northwest has changed dramatically. Some normal variations (such as weather, or ocean conditions) and natural disaster events are, of course, beyond human control. The vast majority of the changes, however, has resulted and continues to result from expressed or implied public policies. The state of the Pacific Northwest's human environment today is a direct or indirect consequence of policies followed over the last two hundred years. This section discusses how the human environment evolved from the era of almost exclusive Native American habitation to the near-present.

- **Note:** *This section is a brief summary. More complete discussions of the development of the Federal Columbia River Power System (FCRPS) and BPA are in BPA's Columbia River Power to the People: A History of Policies of the Bonneville Power Administration (Norwood, 1981), and Richard White's The Organic Machine*

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(1995). The history of water policy and effects from water usage are documented in John Volkman's *A River in Common: The Columbia River, the Salmon Ecosystem, and Water Policy* (1997). Several comprehensive sources of information about the current salmon and resource problems in the Basin include the National Research Council's *Upstream: Salmon and Society in the Pacific Northwest* (NRC, 1995); Jim Lichatowich's *Salmon Without Rivers* (1999); the *SNAKE RIVER SALMON RECOVERY TEAM: FINAL RECOMMENDATIONS TO THE NATIONAL MARINE FISHERIES SERVICE (Snake River Salmon Recovery Team, 1994)*; *Saving the Salmon*, by Lisa Mighetto and Wesley J. Ebel (1994); and *The Great Salmon Hoax*, by James Buchard (1997). Several sources are especially helpful for a fuller understanding of tribal rights and interests, including the following: Felix Cohen's *Handbook of Federal Indian Law* (1945); Steven Pevar's *The Rights of Indians and Tribes: the Basic ACLU Guide to Indian and Tribal Rights* (1992); and the Columbia River Inter-Tribal Fish Commission's *Spirit of the Salmon (Wy-Kan-Ush-Mi Wa-Kish-Wit)* (CRITFC, 1996)

2.3.1.1 The Era of Basic Subsistence: Early Native American Indians through the Arrival of Lewis and Clark in 1803

Over two hundred years ago, the human population in the Columbia River Basin was populated almost exclusively by American Indian peoples. The Cascade Range divided semi-arid deserts from rich fertile forestland. The Columbia River flowed uncontrolled and unpredictably through the region, sustaining enormous runs of anadromous fish, as well as abundant populations of resident fish and wildlife.

The first residents of the Pacific Northwest developed distinctive coastal and inland cultures that are now thousands of years old. Survival depended on use of the environmental resources within the region—the air, land, and water that supported vegetation, fish, and wildlife—and on elaborate trade networks. For tribes that were not too far upriver, the basis of the aboriginal economy was fishing.³ For some tribes, salmon was not merely an important food—it was at the heart of an entire way of life. It was the staple item in the tribal year-round diet and a major commodity in trade between tribes.⁴ Salmon was caught at various locations along the river by numerous tribes as the fish swam upstream to spawn. Other fish, marine mammals, waterfowl, game, and plant food sources were also plentiful.

The policies regarding fish and wildlife for the Columbia River basin at this time consisted of traditional cultural practices directed and preserved by elders of the many tribes and bands that inhabited the area. In general, these cultural practices were based on the belief that there is a close physical and spiritual interrelationship between humans and nature. This close bond of the Indian to the natural world was demonstrated by the seasonal cycle of subsistence that formed an integral part of the tribal cultural fabric. For example, some Columbia River tribes engaged in ceremonies to help ensure the return of

³ White, *The Organic Machine* (1995), p. 18: "At The Dalles the Wishrams and Wascos derived between 30 and 40% of their annual energy requirements from salmon; at the other extreme, farther up river, the Kutenais, Flatheads, and Coeur d'Alenes obtained 5% or less."

⁴ American Friends Service Committee, *Uncommon Controversy* (1970), p. 3.

the sacred salmon.⁵ They waited for salmon with anxiety because there were times when natural events precluded or drastically reduced the salmon runs.⁶ The tribes also placed special significance on certain places in the landscape, especially near the river. Tribal elders used traditional cultural practices to implement spoken policies requiring members to honor and respect the sacredness of the natural world. These policies allowed for harvesting of natural resources for basic subsistence and for trade and commerce with other tribal groups. Part of this cultural view saw land as sacred, something never to be actually owned, although human occupants might serve as its guardians or custodians.

When Europeans first arrived in the Pacific Northwest, they found an environment rich in natural resources: a braided network of rivers running clear waters; a wide range of ecosystems that supported fur-bearing and other animals; abundant game and non-game species of birds and animals; and vast sweeps of forest. Fish were usually abundant in the Columbia River system. In 1803, when Lewis and Clark first encountered the Columbia River in their search for a westward path to the sea, they found a river running with approximately 8-10 million adult salmon.⁷ The environmental elements—air, land, and water—were clean and pristine, and the native ecosystems functioned in a natural balance, without significant human intervention.

2.3.1.2 The Era of Land Claims and Commercial Development: 1803 through the mid-1930s

With Euro-American exploration and settlement in the region, the age-old policy direction of basic subsistence soon gave way to a new era of an emerging commercial focus, as competition for the sea otter fur trade brought non-Indians to the Oregon Territory. Non-Indian settlers regarded resources differently from Native Americans. Wildlife and other resources were taken, not just for subsistence, but for their commercial value. Conflicts over land ownership, exploitation of resources, and a host of related issues with particular significance for Native American peoples would begin to surface.

Before the Pacific Northwest region became part of the United States, European nations competed to control its important seaports and resources. Beginning with the 1803 Lewis and Clark expedition to the Pacific Northwest, the United States government, motivated by what has become known as Manifest Destiny,⁸ began to invoke actions to claim territories of the west, induce settlement on the claimed territories, and commercially exploit the vast natural resources of the region.

This new policy direction shifted emphasis to the following:

⁵ Lichatowich, Salmon without Rivers (1999), pp. 33-37.

⁶ White (1995), pp. 18-19.

⁷ NRC (1995), p. 15. The Council suggests that the number may have been higher, perhaps as high as 16 million salmon returning to spawn every year. See Council (1986), Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin, Appendix D of the Columbia River Basin Fish and Wildlife Program. For an excellent account of Columbia River salmon issues generally, see C. Wilkinson, Crossing the Next Meridian: Land, Water, and the Future of the West 175 (Island Press, 1992).

⁸ A U.S. policy during the 19th and early 20th century of imperialistic expansion defended as necessary or benevolent (1984, Webster's II New Riverside University Dictionary).

- control of the territory,
- displacement of Indian tribes,
- settlement and withdrawal of lands,
- government ownership of lands,
- extraction of natural resources,
- harnessing of the river(s) for irrigation and flood control, and
- development of hydroelectric power.

By about 1830, settler-carried diseases had spread as epidemics among the vulnerable area tribes, killing about 90% of the individuals of the lower Columbia River tribes.⁹ When, in the 1840s, the first major wave of Euro-American settlers arrived along the Oregon Trail, there was still no established national sovereignty. As a result, there were several years of struggle among national, religious missionary, and ethnic factions. Settlement by non-Indians continued to bring disease and discord to the native Indians, with disastrous effects on the various tribal populations.

Commercial Fishing

By mid-nineteenth century, the burgeoning European-American population of the Northwest had found many ways to make a living: aside from would-be gold miners, there were farmers and ranchers, trappers (although, as the resource dwindled, so did the profession), and merchants. Anyone near a river still frequently saw a glittering bounty of fish available for the taking.

- The 50,000 to 60,000 Native Americans who lived in the Columbia Basin in the early 1880s are estimated to have harvested about five to six million adult salmonids per year.¹⁰
- Non-Indian commercial harvest had occurred in the Lower Columbia River since the 1860's and peaked for the different runs in the late 1880s and 1890s with the harvest of chinook at 43 million pounds, sockeye at 45 million pounds, coho at 7 million pounds, and chum at over 8 million pounds.
- During this time, canneries packed as many as 630,000 cases of forty-eight one-pound tins during the annual runs. In 1906, fish wheels were taking more than a million fish each year. There were 55 canneries in Oregon alone.

As with the sea otter and beaver, this intensifying harvest effort soon led to repeated declines in the annual catch. Toward the end of the nineteenth century, Oregon and Washington began to impose restrictions on harvest and to establish closed seasons to protect the commercial fisheries. However, the laws were haphazard and provided little effective protection. By the 1870s, the states of Oregon and Washington had begun to

⁹ Cone, Joseph, *A Common Fate* (1995). Corvallis, OR; Oregon State University Press, p. 108.

¹⁰ Council (1986).

turn their attention to hatcheries, using artificial production to supplement runs already decimated by habitat damage (due primarily to destructive mining, grazing, and logging practices in tributary stream watersheds), commercial fishing, and an absence of fisheries management. Through the 1920s, Columbia River salmon were typically harvested for commercial purposes in the river with gillnets and fish wheels. No serious effort to limit harvests would be taken for years. In the meantime, under the combined effects of excessive harvesting and tributary habitat degradation, salmon populations dwindled.

Commercial Trapping¹¹

In a cultural (and therefore policy) shift, the new immigrants took wildlife, not just for subsistence, but for its commercial value. While the use of fish and wildlife for trading purposes was pre-historic, indigenous peoples had self-regulated their usage with taboos and punishment.¹² Trappers, however, continued to trap and sell, without regulation, pelts from fur-bearing animals. The trade flourished through the early 1800s, but ceased to be a significant economic activity by 1850, largely because animals were hunted to near-extinction. By 1829, for example, the sea otter had been all but exterminated. Americans then began to bid for inland furs, primarily beaver. It took just two years to reduce the beaver population to near-extinction levels in the Snake River country.

Changes to Forests and Streams

The vast forests of the Pacific Northwest were initially seen as both opportunity (materials for homes and businesses and fences) and impediment. Commercial cutting began in the 1800s when the first non-Indian immigrants settled and farmed the interior valleys of western Oregon and the Puget Sound region. The extensive forests and the riparian areas that covered much of the landscape were cleared and burned to make way for agriculture. Streams and rivers and rivers were channelized (directed and contained), and large tree and riparian vegetation were removed. These actions drained the extensive wetlands and increased the rate of water runoff. Because the supply of trees seemed inexhaustible, and because it was hard and time-consuming work to fell trees with hand saws and axes, any trees with low commercial value were frequently left standing.

Commercial lumber operations meant not only cutting of trees, but also construction of temporary dams to float logs downriver. Such dams altered river flows, affecting fish, wildlife, and riparian vegetation. Rafts of logs, shooting down small rivers, scoured the channels bare of spawning gravels, riparian vegetation, and instream cover. Little or no attention was given to mitigating this habitat destruction. Some early attempts through hatchery mitigation occurred, in part, to offset these destructive logging practices in tributaries.

¹¹ Information in this discussion is from USDOE/BPA, Corps, and BOR, Columbia River System Operation Review (SOR) Final Environmental Impact Statement, Appendix G - Section 2.1.2 (1995).

¹² Lichatowich (1999), p. 40.

Mining¹³

Although not currently a major industry in Oregon, mining for precious metals has continued here from the early days of settlement until the present. Finding gold and silver was the priority of the first miners in the 1800s and early 1900s. Mining, whether for gold or gravel, usually takes place in or near streams and creeks: salmon use the same waterways for spawning and rearing.

The initial mining practices (some underground mining, but mostly placer, or dredge, mining) caused tremendous destruction of salmon habitat in streams and creeks. With placer or dredge mining, miners removed large amounts of the stream bed, then washed and screened the material to find precious metals, and finally discarded the processed material along stream banks. In some situations, mining may have released or concentrated naturally occurring hazardous materials such as mercury, which may then have become concentrated in aquatic life and in those who dined upon it—especially Native Americans. In the case of underground, or hard-rock, mining, water from streams was needed to wash the mined material.

These operations disrupted salmon activity in the affected streams and created permanent changes in stream structure. For example, scooping out the streambed deepens the channel of the stream. This may increase the speed of the water flow in the stream, disturbing or destroying salmon spawning grounds and removing streamside vegetation. Also, erosion from the tailings of hard-rock mining carries trace amounts of toxic chemicals, such as mercury, into streamflows or into sediments in streambeds and floodplains. Agencies such as the USFS are exploring ways to restore streams that were dredged by early miners.

The removal of sand and gravel below the water surface deepens streams, disturbing spawning grounds and possibly causing the rate of water flow in the stream to speed up. Juvenile salmon, however, need calm, slow-flowing water to live in as they develop. Further, removal of gravel from the floodplains has historically meant the loss of spawning habitat.

Today, however, sand and gravel mining account for most of the mining activity in Oregon, as urban development activity is brisk. That means high demand for concrete and asphalt, building products that require liberal amounts of gravel as a basic component.

Gravel mining activities can be divided into three categories. *Deep water dredging* for sand and gravel takes place in fairly deep water near the main channels of the rivers. Also, in some areas, sand and gravel companies conduct *gravel bar scalping* operations, which involves removing material that builds up on sandbars in the river. There are also *gravel pits excavated* by sand and gravel companies in floodplain areas near rivers.

¹³ The following material is from an article by Bob Rost in [A Snapshot of Salmon](#) by the Oregon State University Extension Service (1998).

Gravel pits are located in areas where flood activity of nearby rivers has caused huge amounts of sand and gravel to accumulate over time.

Regulations can help protect salmon that spawn in the shallow gravel of shaded, calm portions of streams and rivers.

Relationships with Native Americans

The Oregon Territory was established in 1848. This federal government recognition posed the difficulty of how to bring about ownership of land—desirable land—where other peoples were already living and on which they depended for their survival. Beginning in the 1850s, the United States government enacted laws and regulations that would displace the native inhabitants of the Oregon Territory from their traditional use lands and allow the United States to claim title of those lands.

Conflict between missionaries and the interior basin Indian tribes erupted as the stream of settlers moving into the region increasingly alarmed the Indian inhabitants.¹⁴ Hostilities between settlers and the Indians were fueled in part, by the lack of treaties. In 1850, Congress passed the Indian Treaty Act, which authorized the purchase of lands from various tribes and removal of Indians to other areas (albeit, where settlers did not want them). Treaties were negotiated with some tribes who were willing to cede some of their lands. Relocation of tribes to reservations was a wrenching and socially disruptive event for tribal people. Unrelated tribes or bands were sometimes grouped together for expediency by the government and relocated onto reservations far from ancestral lands and resources. However, virtually all of the tribes asserted the need and desire to retain some lands for their own use.

Washington became a territory of the United States on March 2, 1855. A key mission in Washington (and Oregon) was the disposition of Indian land rights. Indian lands were rapidly being taken by settlers who were encouraged by the Oregon Donation Land Act.¹⁵ In order to foster development and “pacify” the tribes, Isaac Stevens (Washington governor and superintendent of Indian affairs) pushed for treaties with Indians who lived along proposed railroad routes.¹⁶ During the same year, Joel Palmer, superintendent of Indian Affairs in Oregon, pursued similar treaties with several Oregon tribes. The desired effect would be to extinguish Indian land ownership in exchange for certain protections for the tribes and enticements for Indians to become agrarian.

Stevens (and Palmer) discovered that the Indians, though recognizing the necessity for selling much of their country, were adamant against being moved away from it, and refused to accept centralized reservations. A basic misunderstanding during the treaty-making lay in the differing concepts about land. Non-Indian culture regarded it as a commodity to be owned, fenced, bought, and sold. To the Indians, land was part of a spiritual heritage, not a chattel and not an article of trade. Stevens acceded to the tribes'

¹⁴ American Friends Service Committee (1970), p. 16.

¹⁵ American Friends Service Committee (1970), p. 16

¹⁶ American Friends Service Committee, (1970), p. 19

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reserving of a portion of their homeland. The importance of the fish to the Indians seems to have impressed Stevens. He did not intentionally reserve to the Indians any more rights than he thought necessary, but he understood that the one indispensable requirement for securing agreement of any kind from Pacific Northwest Indians was to assure their continued right to fish. That right was as valuable to them as their lives: "It was also thought necessary to allow them to fish at all accustomed places, since this would not in any manner interfere with the rights of citizens, and was necessary for the Indians to obtain a subsistence."¹⁷

Through treaties with the United States, several Columbia River tribes¹⁸ reserved their right to fish inside and outside reservation boundaries. These rights would become, by the mid-20th century, an important point of contention and legal action, as well as an issue with biological and cultural significance.¹⁹ In a treaty with the United States, the Shoshone-Bannock Tribes of the Fort Hall Reservation also reserved rights to fish for anadromous species. Also, in the northern Great Basin of Idaho and Oregon, a series of peace treaties was conducted with several Shoshone and Bannock groups, culminating in the Fort Bridger Treaty of 1868.

In short order, conflict erupted over the recently concluded treaties. Settlers, misled by word that the treaties were in full effect, began moving onto Indian lands before congressional ratification. The tribes had been promised that they would not have to move until the treaties were ratified—perhaps two years later—and tribal distrust of the terms of the treaties grew. A period of hostilities and, in some cases, war erupted in the aftermath. Congress delayed ratification of most treaties until hostilities were ended.

In 1871, Congress passed legislation to cease any new treaties with Indian tribes and stopped recognizing additional tribes as separate nations. The legislation specifically recognized that all existing treaties then in existence were to be honored. The federal government thereafter relied upon Agreements and Executive Orders to legally acquire Indian lands, allow tribes to cede lands, establish reservations, provide federal recognition of tribes, and remove Indian peoples to reservations. Tribes also had, and have, constitutions and by-laws that formalize their governmental organization and state their relationship with the Federal government.

In 1887, Congress passed the General Allotment Act (the Dawes Act). This legislation allotted reservation lands to individuals. Under the treaties, land was held in common by the tribe and the concept of individual ownership was unknown. The primary purpose of

¹⁷ American Friends Service Committee (1970), p. 21.

¹⁸ These four tribes are the Nez Perce Tribe, Confederated Tribes of the Umatilla Indian Reservation, Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes and Bands of the Yakama Indian Nation, which have reserved the right in fish in "usual and accustomed places" along with "citizens of the territor(y)."

¹⁹ See generally Tribal Circumstances and Perspective Analysis of Impacts of the Lower Snake River Project on the Nez Perce, Yakama, Umatilla, Warm Springs, and Shoshone Bannock Tribes, prepared by the Columbia River Inter-Tribal Fish Commission as part of the Army Corps of Engineers Lower Snake River Juvenile Salmon Migration Feasibility Study (CRITFC, 1999).

these Acts was to encourage individual ownership and farming. In practice, however, this program failed and much of the lands reserved in the treaties passed from tribal ownership and was subsequently sold.

Under the federal goal of settling the land, the government encouraged immigrants to develop the West, securing the young country's claim to its borders and all that lay inside them. The government began to grant land rights to settlers and railroads. By the mid-twentieth century, the resulting differences in land ownership and management practices and objectives, and the increasing population pressure on land, water, fish, wildlife, and vegetation, would set the stage for a complexity of interests and approaches to the overall policy direction for enhancing commerce.

Agricultural Development and Water Competition

The gold rushes of the 1850s and 1860s stimulated another kind of commerce—agricultural development. The region became populated with erstwhile miners who had migrated West to seek their fortunes, but who—finding rich soil instead—stayed to farm.²⁰ Inland settlers found a vast, arid prairie ideal for raising livestock: more than 90 million acres of grassland covered eastern Oregon and Washington and southern Idaho. Where settlers had access to waterways, wheat and grain farming quickly became the dominant economic activity.²¹

The gold rush, and subsequent agricultural development, further increased environmental pressures on natural resources. Any impulse toward cooperation tended to be undermined by the stipulations of land initiatives, which inadvertently promoted *individual* gain rather than collective benefit.²² Resources were used without regard for future consequences.

Near the end of the nineteenth century, federal interests began a shift in policy direction: from exploration and development to retention and management of those lands—keeping them (more safely, it was thought) under the wing of the government itself. Lands were now withdrawn to delineate Indian lands, timber resources, potential power sites, scenic areas, grazing lands, and lands to be managed for other public uses. The 1890s saw withdrawals of land that eventually became National Forests administered by the USFS. Some withdrawn areas were subsequently designated as national parks to be managed by the National Park Service (NPS).

That control extended to the waters of the United States as well: canals and locks were built to enable commerce, interrupting river flow and blocking passage for anadromous fish upstream to their natal streams. Nevertheless, commercial development remained the policy focus through the 1930s, as fish harvests were escalated by new technology

²⁰ Pacific Northwest River Basins Commission Columbia North-Pacific Region Comprehensive Framework Study (PNRBC, 1997). Appendix 9: Irrigation. Vancouver, WA, p. 4.

²¹ PNRBC (1971), p. 3.

²² Faltey, John, The Inland Empire: Unfolding Years, 1879-1929 (1986). Seattle: University of Washington Press, pp.88-90, 97-99; Lichatowich (1999), pp. 48 and 50.

and rivers were harnessed by dams for irrigation and flood control, as well as for the coming push to produce hydroelectric power. Issues such as effects on fish, wildlife, vegetation, or even the regional population were considered only minimally, if at all.

Early 20th Century: Taming Land and Water

The Reclamation Act of 1902 brought about the construction of large, multiple-use federal dams, such as the Minidoka in Idaho, which combined the purposes of flood control, irrigation, and hydropower. However, a change in the accustomed flow of water at any one point inevitably affects fish, wildlife and human uses both at that point and downstream. At this point in policy development, however, such issues were discounted or not considered at all.

In 1915, more canals and locks were built on the river, this time at Celilo Falls. When the project was completed in May of 1915, six steamboats passed through the newly opened canal. Waterborne commerce developed as planned and the canal helped keep rail rates below monopoly levels. Commerce on the river remained light until the current set of multi-purpose dams was constructed in the Columbia and Snake rivers (beginning 1938).

In 1920, Congress responded to the surge in demand for electric power created by World War I by enacting the Federal Water Power Act, which established the Federal Power Commission (FPC), later to become the Federal Energy Regulatory Commission (FERC). The FPC was responsible for licensing non-federal hydroelectric power projects that affect navigable waters, occupy federal lands, use water or water power at a government dam, or affect the interests of interstate commerce. The Act also required the FPC to license only those projects that in its judgment were " . . . best adapted to a comprehensive plan for improving or developing a waterway or waterways"²³

Between 1803 and 1930, then, almost all the policy issues that currently interweave and conflict had developed: governmental authority, fishing rights, irrigation, transportation, flood control, hydroelectric power, land use, land ownership, and so on. The fish and wildlife resources were in substantial decline from the immense immigration of European settlers, who developed the land and used the water. Recognition of environmental issues lagged behind in the continuing drive to settle the West, exploit its vast natural resources, and move the country to a position of commercial (and therefore political) power.

Early State and Federal Fish and Wildlife Management

Two of the contemporary deans of environmental law have observed that "[t]he public attitude toward wildlife as a resource has shifted from that of putting food on the table to one of recreational, scientific, and aesthetic interest, and wildlife management and protection has become a legal matter."²⁴ In most of the nineteenth century, the few basic state fish and wildlife statutes were ineffective for lack of funding for wardens,

²³ Federal Power Act, 16 USC 891-928. Coggins and Wilkinson, 1987.

²⁴ G. Coggins and C. Wilkinson, Federal Public Land and Resource Law (1987), p. 779.

equipment, and programs. The 20th century, however, saw the evolution of wildlife law from a set of relatively narrow state hunting and fishing rules to a more comprehensive, frequently interjurisdictional schemes of broader dimensions and perspectives.

Some examples of major early federal statutes addressing fish and wildlife management include the following:

Migratory Bird Treaty Act (1918)

The original 1918 statute implemented the 1916 Convention between the U.S. and Great Britain (for Canada) for the protection of migratory birds. Later amendments implemented treaties between the U.S. and Mexico, the U.S. and Japan, and the U.S. and Russia. The statute provides for establishment of a federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention...for the protection of migratory birdsor any part, nest, or egg of any such bird."

Migratory Bird Conservation Act (1929)

The Act established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds. The Commission is directed to report each year to Congress on its activities during the preceding fiscal year. The Secretary of the Interior is authorized to cooperate with local authorities in wildlife conservation and to conduct investigations, to publish documents related to North American birds, and to maintain and develop refuges. The Act provides for cooperation with States in enforcement. It established procedures for acquisition by purchase, rental or gift of areas approved by the Commission for migratory birds.

Migratory Bird Hunting and Conservation Stamp Act (1934)

The "Duck Stamp Act" requires each waterfowl hunter 16 years of age or older to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations. Funds are merged with receipts under the Wetlands Loan Act for the acquisition of migratory bird refuges.

Federal Aid in Wildlife Restoration Act (1937)

Funds from an excise tax on sporting arms and ammunition are appropriated to the Secretary of the Interior and apportioned to States on a formula basis for paying up to 75 percent of the cost of approved projects. Project activities include acquisition and improvement of wildlife habitat, introduction of wildlife into suitable habitat, research into wildlife problems, surveys and inventories of wildlife problems, acquisition and development of access facilities for public use, and hunter education programs, including construction and operation of public target ranges.

With the clarification in 1896 that wildlife was owned in trust by the states for their people, states began exercising a fundamental right stemming from that authority: taxation. Hunting and fishing license fees generated considerable state revenues and became the primary source of funds for fish and wildlife management. A symbiosis then developed in which the states' resource regulators began regulating on behalf of those who paid for the regulations: hunters and fishermen. With few exceptions, until the mid-1960's, Congress imposed minimal requirements on states' management of fisheries and wildlife.

2.3.1.3 The Era of Federal Intervention: The mid-1930s up to the Regional Act in 1980

After the stock market crash of 1929, and during the subsequent multi-year Depression, federal action focused both on managing the resources and providing economic support for the shaken economy in the form of projects. These projects—large and small—would provide work and jobs, and would support a strong nation. This meant that the policy direction was to make major and broader changes to the environment, both water and land.

Although early settlers had turned their attention to canals and dams on tributaries, the Columbia River itself was difficult to harness. Some private entrepreneurs sought authorization to build some projects. However, by 1930, the FPC had withdrawn four hydro project licenses from one potential developer who was not moving quickly enough to build dams at the current locations of Chief Joseph and McNary Dams. In 1931, non-federal developers began construction of Rocky Reach Dam.

The federal government itself did not approach the Columbia River seriously for development until 1925 when the Rivers and Harbors Act instructed the Corps to survey and report on the Columbia's potential for electric power, navigation, flood control, and irrigation development. The authorizing legislation specifies the purpose, or purposes, for which the Corps may operate the dams. Completed in March 1932, the 1845-page "308 report" document characterized the Columbia as the "greatest system for water power to be found anywhere in the United States,"²⁵ and recommended ten dams for navigation and electricity production. Construction soon began on two massive dams: the Grand Coulee Dam in 1937, and the Bonneville Dam in 1938.

A commerce-driven policy direction was now moving to center stage. Decisionmakers recognized both the potential bonus for development offered by dam-building *and* the possibility that the anadromous fish population would increasingly be hampered in its attempt to travel from its natal stream to the ocean and back. Human needs were given priority, and the report was approved. Construction of dams was authorized to meet these needs. A 1937 compromise created BPA as an interim agency within the Department of Interior (DOI). The agency was to market power output from the federal dams on the Columbia, giving preference to public customers.

²⁵ 308 Report (1932), Item #7, March 29, 1932.

Flood Control

Hydropower generation and marketing was only one aspect of dam building that supported human needs. Flood control was also important. The Columbia and other major tributary rivers were not yet tamed by the dam projects suggested by the Corps report. Flooding was a frequent, but unpredictable, occurrence as winter snows melted or storm cycles passed through the country. Significant flood events occurred throughout the Columbia River Basin, washing away vegetation, rearranging the river course, and renewing low-lying lands with rich deposits from upstream.

From 1953 - 1975, 15 federal dams were built on the Columbia and Snake Rivers, a dramatic increase over the preceding era. Twelve of the dams are part of the FCRPS, for which the Corps maintains primary responsibility for day-to-day operation and maintenance. In 1964, the Corps, the Bureau, and BPA entered into an inter-agency contractual agreement, the Pacific Northwest Coordination Agreement, to coordinate operations of the FCRPS and non-federal dams in the basin.

The federal government also looked beyond its borders: in 1961, the United States and Canada entered into the Columbia River Treaty. The treaty, however, which allows joint United States/Canada development on the river, addresses only two issues: hydropower generation and flood control. The agreement contains no provisions related to environmental concerns or the needs of salmon, and is therefore very limited in its reach.

The Northwest transmission system was developed simultaneously with hydroelectric development. These transmission lines were built to move the new generation to the load areas. The capability of the transmission system is tied to generation levels, especially at the critical hydroelectric projects along the Lower Columbia and Lower Snake rivers.

Non-Federal Hydroelectric Development

By 1932, the Oregon Fish Commission estimated that "approximately 50% of the most productive area within the basin [had] been lost to the salmon industry by the construction of dams for irrigation and power, thus isolating spawning areas."²⁶

The federal government was a prime mover for building dams in the 30s, 40s, and early 50s and beyond. Congress also authorized Grant County Public Utility District to file an application for a license to build a dam at Priest Rapids (mid-Columbia). That license was followed by licenses for more dams, all to be operated by the mid-Columbia public utility districts. FERC has regulatory authority over non-federal hydroelectric projects on the Columbia River and its tributaries. Until 1986, FERC was not required by law to include provisions for fish and wildlife affected by the licensed projects. FERC must now consider federal and state fish and wildlife agency recommendations to protect and mitigate damages caused by the licensed projects. Many of the original licenses granted by FERC were issued several decades ago for a period of fifty years. Most contain no fish and wildlife conditions. Numerous projects in the region have licenses that will

²⁶ Lichatowich (1999), p. 70.

expire within the next decade and must be relicensed by FERC. The relicensing process provides an opportunity to set conditions for project operations to meet the needs of fish and wildlife.

In the early 50s, there was a move by the Eisenhower Administration to encourage private development, rather than federal control, of hydroelectric projects. The Idaho Power Company received its license to build a series of three dams, the Hells Canyon Complex, in 1955. When complete, the complex blocked 80% of the habitat for Snake River fall chinook and created water quality problems, such as elevated water temperature, that remain unresolved.

Effects from Dam Construction and Operation on Fish and Wildlife

Dams have had an enormous effect on downstream and upstream fish and wildlife habitat. Grand Coulee Dam (completed in 1941) permanently blocked 1400 miles of spawning habitat for chinook.²⁷ It eliminated the famed Kettle Falls fishery and all remnants of many upriver fish runs and inundated 56,000 acres²⁸ of land that previously supported a variety of wildlife. The Hell's Canyon Complex, constructed by Idaho Power Company in 1967, eliminated all remaining anadromous fish production in the upper Snake River Basin, including sockeye, spring/summer, and fall chinook salmon;²⁹ it also inundated wildlife habitat. This was especially offensive to fishery interests because Idaho Power Company's federal license to build the dam required passage for salmon. The National Research Council has estimated that of the original salmon and steelhead habitat available in the Columbia River Basin, "55% of the area and 31% of the stream miles have been eliminated by dam construction."^{30,31}

Other run-of-river dams (such as the John Day, 1968) on the Columbia and Lower Snake all have fish ladders and, therefore, allow passage of adult salmon.³² However, the reservoirs created by storage dams inundated salmon spawning grounds, wildlife habitat, and cultural resource sites. It took years for many in the region to recognize the negative ecological and economic consequences to the fishery from more than 100 years of development. Hatchery fish mitigation tended to mask the effects: even though upper river species of salmon were only a fraction of their historic abundance, the average total harvest in the mainstem Columbia was around 550,000 fish in the 1960s and 1970s. The catch rose to around 720,000 in the 1980s; 1.6 million fish were taken in 1986, largely due to the success of hatchery operations in the lower Columbia River. Today hatchery fish constitute 80% or more of the catch for most chinook and coho species. Tribal

²⁷ Lichatowich (1999), p. 222.

²⁸ Note: This figure represents land area inundated, and does not include former river area. Personal communication between Kathy Pierce, Bonneville Power Administration, and Craig Sprankle, Public Affairs Officer, Grand Coulee Power Office, Bureau of Reclamation. December 2000.

²⁹ Snake River Salmon Recovery Team: Final Recommendation to the National Marine Fisheries Service (1994), p. II-8; Council, Strategy for Salmon (1992), Vol. I, pp. 28, 33.

³⁰ NRC (1995), p. 53.

³¹ T. Palmer, The Snake River (1997), p. 189.

³² Berryman et al., "Snake River Steelhead: An Endangered Fishery Threatened By Dynamic Instability?" <<http://classes.entom.wsu.edu/Papers/>>

fisheries in the upper basin were particularly hard hit since hatchery programs did not necessarily mitigate for the species affected or provide mitigation in locations where fish losses occurred.

Timber Harvest

The commercial interest in timber also continued to grow. With the invention of the gas-powered chainsaw and improvements in transportation soon after World War II, logging greatly increased on federal lands in the Pacific Northwest.

Timber harvesting had important consequences for wildlife, soils, vegetation, water quality and fish—as well as for local economies. Human needs for recreation (in the form of hunting and fishing), as well as federal revenue needs and commercial desires for the easiest possible harvest, shaped timber harvest management. Forests were fragmented to increase habitat conditions preferred by deer and elk populations. Extensive road systems were developed to facilitate timber harvest and provide easy hunting and fishing access. Revenues from timber harvest improved local economies and provided substantial funds to the federal Treasury. It was assumed that forests managed in this manner could be cut and regrown at relatively short intervals (such as 40 to 80 years) without negatively affecting other resources such as water quality, fish, soils, or terrestrial animals.

Mitigation/The Environmental Movement

For more than 150 years, the European American settlers of the West and their descendents had treated the natural resources—the forests and rivers, the land and air, the fish and wildlife that live in them—like the farmer with the goose that laid the golden egg. (The farmer killed the goose to get all the eggs inside and so, of course, got no more eggs at all and lost the goose to boot.) Public awareness of declining conditions began to affect public policy in the middle of the twentieth century. People saw clearcuts not returning to their healthy pre-cut state, saw the game they hunted become more scarce, saw the streams plug up with silt when heavy rains washed dirt down eroded banks, and saw the numbers of salmon returning from the ocean steadily diminish.

In 1949, under the Mitchell Act, the first major federal funding for fish effects occurred (although hatcheries had existed since the turn of the century). It authorized funding for state and federal hatcheries on the Lower Columbia River. The hatcheries were meant to offset the consequences on fish primarily from irrigation projects and overfishing, but also for the consequences from construction of Bonneville and Grand Coulee dams. Funds were used to pay for large irrigation diversion screening programs and hatcheries, mostly in the lower Columbia River below the dams, and where they would intentionally benefit non-Indian fisheries in the ocean and lower river (see section 2.3.2.3). Because upper basin stocks losses were not mitigated with hatcheries until later, catches (especially those in upriver tribal fisheries) continued to decline. At the time, hatcheries were chosen to remedy the loss due to dams and other related actions, without an understanding of genetic consequences and potential effects on wild fish. Salmon

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production during the current era would have probably fallen even more precipitously if salmon produced in hatcheries had not increased sharply after World War II.

In 1950, the Federal Aid in Sport Fish Restoration Act, commonly called the Dingell-Johnson Act or Wallop-Breaux Act, was enacted. It provided federal aid to the states for management and restoration of fish having "material value in connection with sport or recreation in the marine and/or fresh waters of the United States." In addition, amendments to the Act provide funds to the states for aquatic education, wetlands restoration, boat safety and clean vessel sanitation devices, and a nontrailerable boat program. Funds distributed to states for the various programs funded in the Act are collected in an account known as the Sport Fish Restoration Account. Funds are derived from an excise tax on certain items of sport fishing tackle, fish finders and electric trolling motors, import duties on fishing tackle, yachts and pleasure craft, interest on the account, and a portion of motorboat fuel tax revenues and small engine fuel taxes.

In 1960, the Multiple Use Sustained Yield Act declared that the purposes of the national forest include outdoor recreation, range, timber, watershed, and fish and wildlife. The Act directed the Secretary of Agriculture to administer National Forest renewable surface resources for multiple use and sustained yield. The Act does not affect the jurisdiction or responsibilities of the states, the use or administration of the mineral resources of national forest lands, or the use or administration of federal lands not within the National Forests. Under the Act, multiple use means management of all the renewable surface resources of the National Forests to meet the needs of the American people. Sustained yield means achievement and maintenance of a high-level regular output of the renewable resources of the national forest without impairment of the land's productivity.

In 1964, the Wilderness Act established the National Wilderness Preservation System. The intent was to designate natural areas for preservation and protection before they became occupied or were modified. The Secretary of the Interior was directed to review every roadless area of 5,000 acres or more and every roadless island within the national wildlife refuge and national park systems for possible inclusion in the System. The Act also included some National Forest lands in the System and directed the Secretary of Agriculture to recommend others. Over 100 million acres have been included in the National Wilderness Preservation System so far.

In response to noticeable environmental pressures from decades of population and commercial growth, the decade of the 1970s brought a surge of environmental legislation from the United States Congress. In 1964, the Wilderness Act was passed. Momentum increased with the National Environmental Policy Act in 1969. Then, from 1970 through 1976, Congress promulgated the following major environmental statutes:

- Resource Conservation and Recovery Act (1972);
- Marine Protection, Research, and Sanctuaries Act (1972);
- Clean Water Act (1972, 1977);
- Endangered Species Act (1973);

- Safe Drinking Water Act (1974);
- Toxic Substances Control Act (1975);
- Coastal Zone Management Act (1976); and
- Hazardous Materials Transportation Act (1977).

Together with ocean harvest reforms adopted in the Magnuson Fishery Conservation and Management Act (1976), the United States-Canada Pacific Salmon Treaty (1985), and the *U.S. v. Oregon* treaty rights case, (1968), a substantial number of environmental rules and regulations were established with which to protect and enhance fish and wildlife, including Columbia River anadromous fish.

2.3.2 Recent Developments: the Period of "Equitable Treatment" for Fish and Wildlife (1980 — 2000)

By 1980, it was accurate to say that Columbia River fish and wildlife policy was in many respects dictated by federal statutes and the implementing policies and regulations. Crucial decisions, especially those involving the Columbia River hydropower system, were made by Congress, federal agencies, and the federal courts.

2.3.2.1 Primary Federal Statutes

Three environmental statutes—the Endangered Species Act, the Clean Water Act, and the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act)—had enormous influence on regional decisionmaking. Two of the Acts were passed in the early 1970s, but their impacts were not very realized until the 1980s. The intent and consequences of these statutes and related decisions are now an integral component of regional fish and wildlife policy.

The Endangered Species Act (1973)

The ESA was passed in an effort to conserve threatened and endangered species. Generally, it authorizes the Secretary of Interior (through USFWS), or the Secretary of Commerce (through NMFS, in the case of anadromous fish and marine species) to determine whether any species is endangered or threatened and to recommend a means to protect it. Thereafter, a Federal agency must consult with the appropriate federal agency (Interior or Commerce) to ensure that its actions will not jeopardize the continued existence of the listed anadromous or marine species. Formal consultations typically conclude with the issuance of a Biological Opinion (BiOp) stating the opinion as to whether the proposed Federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. Should a BiOp reach a conclusion of jeopardy or adverse modification conclusion, reasonable and prudent alternatives are offered as options to project implementation that would avoid the likelihood of jeopardy to the species or adverse modification of critical habitat.

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If a jeopardy opinion containing reasonable and prudent alternative(s) is issued, the action agency may: 1) adopt the reasonable and prudent alternative(s); 2) not undertake the proposed action; 3) request an exemption from section 7(a)(2) of ESA; 4) reinstate consultation based on modification of the proposed action or development of a reasonable and prudent alternative not previously considered; or 5) proceed with the action if it believes, upon review of the BiOp, that such action satisfies section 7(a)(2).

In the Columbia River Basin, Snake River chinook and sockeye salmon runs were listed under the ESA in the early 1990s. As required under the Act, NMFS developed a BiOp evaluating the effects of federal agency hydroelectric operations on those runs. Since that time, the FCRPS has been operated in accordance with that BiOp or its successors to ensure compliance with the ESA.

The requirements of the ESA and the subsequent BiOps, habitat conservation plans, and rules for protecting critical habitat developed by NMFS and USFWS have become the guiding directives for Columbia Basin resource management and development. NMFS administers the Act as it applies to anadromous fish and marine mammals, while the USFWS does so for non-anadromous fish and other wildlife.

Current ESA listings affect the implementation of many laws and policies that allow and regulate natural resource use in the basin, including legislation that defines BPA, Corps, and Bureau policies; federal land policies; and international and domestic fishing laws. (See **Appendix C** for a listing of fish and wildlife species in BPA's Service Territory).

NMFS, through the Habitat Conservation Plans (HCPs), critical habitat designations, and BiOps, is beginning to develop an overall recovery planning strategy for ESA-listed stocks of anadromous fish. Starting with the 2000 Biological Opinion of the FCRPS, NMFS has set survival and recovery goals for the listed fish it oversees. These goals will apply across the landscape to all agencies and all actions upon which NMFS is consulted. NMFS' metrics—measures of progress toward the survival goals—can also be applied to any proposed action. The ESA requires that recovery plans contain (1) objective, measurable goals for delisting; (2) a comprehensive list of the actions necessary to achieve the delisting goals; and (3) an estimate of the cost and time required to carry out those actions. In addition, National Oceanic and Atmospheric Administration (NOAA) Recovery Planning Guidelines suggest that recovery plans include an assessment of the factors that led to population declines and/or that are impeding recovery. Finally, it is important that the plans include a comprehensive monitoring and evaluation program for gauging the effectiveness of recovery measures and overall progress toward recovery.

Recovery goals must, at a minimum, restore listed ESUs (evolutionarily significant units) to levels at which they are no longer threatened and can therefore be delisted under the ESA. Recovery Teams will be formed and (1) identify population and ESU de-listing goals; (2) characterize habitat/fish abundance relationships; (3) identify the factors for decline and limiting factors for each ESU; (4) identify the early actions that are important for recovery; (5) identify research, evaluation, and monitoring needs; and (6) serve as science advisors to groups charged with developing measures to achieve recovery.

Recovery plans will address all salmonid species within a series of discrete geographic areas, or domains.

The Basin-wide Strategy Paper³³ is a recovery strategy that outlines the strategies and specific actions that federal agencies operating within the Columbia River Basin should take to prevent extinction and foster recovery by improving survival across all life stages of listed anadromous fish ESUs. In addition, the Basin-wide Strategy Paper is a blueprint to guide federal actions and interactions with state and local governments and tribes as they take steps to comply with the ESA and exercise their authorities. BPA expects recovery planning for listed anadromous fish will likely proceed along the lines discussed in the Basin-wide Strategy Paper.

The Clean Water Act (1972)

The CWA was passed in 1972 and amended in 1977, with a goal of restoring and maintaining the chemical, physical and biological integrity of the nation's waters. It authorizes the Administrator of the EPA to take the necessary action to prevent, reduce, or eliminate the pollution of the navigable waters and ground waters and improve the sanitary condition of surface and underground waters.

Like the ESA, the CWA is a source of increasing conflict between natural resource use and environmental protection. The Act has resulted in important changes to water management practices, regulated point-source discharges, and increased funding and management for non-point source pollution. Increasingly, the Act is viewed as a mechanism to obtain ecosystem improvements, particularly improving temperature and dissolved gas levels in the Columbia and Snake rivers. But these improvements in water quality are sometimes beyond the ability of dam operators to achieve (because those improvement levels cannot be reached under natural settings), or sometimes in conflict with the needs of endangered species. Efforts to reduce temperature and gas levels for CWA purposes, for example, appear to conflict with the direction from NMFS for the Corps to spill more water for salmonid migration.

Although federal agencies play a significant role in the Columbia River Basin, states have primary authority to govern water allocation systems within their boundaries. States also play a role in regulating hydroelectric projects throughout the region under both state and federal laws. The states of Oregon, Washington, and Idaho are all operating under consent decrees with the EPA to develop total maximum daily load standards. Among the three states, there are over 2,500 water bodies that fail to meet CWA standards.

The Regional Act and Its Influence

The basis for starting this section of the FWIP DEIS with the year 1980 was the passage that year of the Pacific Northwest Electric Power Planning and Conservation Act (16 U.S.C. §§ 839 to 839h; commonly referred to as the Regional Act). Concerns over adequate power supplies and fish and wildlife harmed by the hydroelectric system led to

³³ Federal Caucus (2000b).

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passage of the Act, which created the Council, an interstate compact agency, and directed the Council to put fish and wildlife mitigation and enhancement on a par with hydroelectric power generation in the operation of the FCRPS. The Act's goals include the following:

- (1) ensuring an adequate, efficient, and reliable power supply, and
- (2) protecting and enhancing fish and wildlife populations harmed by federal hydroelectric projects.

The Council is responsible for promulgating a Regional Power Plan and a Fish and Wildlife Program. When developing its Fish and Wildlife Program, the Council defers to the recommendations of fishery agencies and the tribes.

The Regional Act requires the Council to consider certain economic factors in its fish and wildlife decisions. The Fish and Wildlife Program must help assure an adequate, efficient, economical and reliable power supply for the region (16 U.S.C. § 839b(h)(5)). Fish and wildlife measures must “utilize, where equally effective alternative means of achieving the same sound biological objective exist, the alternative with the minimum economic cost.” (16 U.S.C. § 839b(h)(6)(C)). The Act requires BPA to act consistently with these plans. Other federal agencies must also take the plans into account to the fullest extent practicable (16 U.S.C. § 839b(h)(11)(A)(ii)). The Council, however, has no authority over the federal agencies that implement the program.

The Act includes a duty for federal agencies that manage, operate, or regulate hydroelectric facilities in the basin to provide “equitable treatment” for fish and wildlife with the other purposes for which the hydro facilities are managed and operated. BPA provides equitable treatment by implementing all or part of the Council's Program and taking action to meet the terms of relevant BiOps. The Ninth Circuit Court has upheld BPA's interpretation, holding that it is reasonable to balance power needs and mitigation needs on a system-wide basis.

The combination of the Regional Act and relevant environmental statutes caused a rapid increase in environmental analyses. For instance, in 1992, the Bureau, Corps and BPA prepared the *Columbia River Salmon Flow Measures EIS*. Next, the agencies prepared and issued the *Interim Columbia and Snake River Flow Improvement Measures for Salmon Supplemental EIS* to address operations in 1993 and subsequent years. In 1995, the Bureau, Corps, and BPA issued the *System Operation Review (SOR) EIS*, which focused narrowly on long-term river management alternatives. In 1999, the Corps issued its draft *Lower Snake River Juvenile Salmon Migration Feasibility Report EIS*.

The SOR, which contains detailed analyses of the effects associated with changes in river operations, is an important source document for this FWIP EIS. However, its scope and focus were defined to exclude certain important considerations. Its scope was limited to analyzing the effects of long-term river management of hydro operations. Studies beyond this scope were not considered in the SOR.³⁴ For instance, generally, alternatives

³⁴ USDOE/BPA, Corps and BOR (1995) p. 10-1.

suggested but determined to be beyond the scope of the document included structural modifications at the projects and actions independent of project operations.

Structural modification measures dismissed from detailed study in the SOR included the following:

- modifying fish ladders,
- installing juvenile bypass facilities,
- installing fish screens at dams and over irrigation diversion outlets, and
- modifying recreational facilities to allow their use over a wider range of operating conditions.

Additionally, some alternatives were suggested that pertained to river uses but did not directly involve operations at the 14 federal projects within the SOR scope.

Non-project measures specifically dismissed from detailed study included the following:

- improving streams and watersheds to restore salmonid spawning and rearing habitat;
- preserving and enlarging wildlife habitat;
- expanding research on hatchery programs and preservation of native fish stocks, and improving hatchery operations;
- banning or further limiting sport and commercial fishing on the Columbia River or the ocean;
- review of logging and mining practices, agricultural runoff, and municipal and industrial pollution;
- modifying irrigation delivery systems; and
- energy and capacity marketing that would shift or adjust load shape.³⁵

Further, since the SOR EIS was issued (1995), the Snake River wild steelhead, and nine populations of salmon and steelhead in Washington and Oregon have been added to the endangered species list. Consequently, additional and broader efforts were launched in the late 1990s, including the Framework process and the Conceptual Plan/Basin-wide Strategy ("All H") process by the Federal Caucus (see section 2.3.2.4).

Finally, the SOR EIS noted that actions outside its limited scope (e.g., harvest, hatchery practices, and habitat) would likely require additional NEPA documentation. This FWIP DEIS delivers on the assurances provided in the SOR FEIS.

2.3.2.2 Other Federal Agencies and General Statutory Responsibilities

The previous discussions describe BPA's responsibilities under the ESA, the CWA, and the Regional Act. Equally important, regionally, are the other federal agencies that also

³⁵ USDOE/BPA (1995b), pp. 4-23 through 25.

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have significant statutory responsibilities that bear upon the use of hydro resources for power and on the responsibilities to administer and protect other resources of the Pacific Northwest. Over time, their roles and their priorities have changed to reflect new information and new policies.

The **Bureau of Reclamation** (Bureau) operates 10 water-storage reservoirs in the upper Snake River, 16 reservoirs in the Middle Snake River, and a number of other storage projects that irrigate some 3 million acres of land: 53.9% of all Washington's irrigated land, 41.8% of Idaho's, and 22.5% of Oregon's.³⁶ Water stored behind the dams is delivered to water users pursuant to contracts between the Bureau and irrigation districts. The Bureau's primary mission of providing water for irrigation has been expanded to include other uses; however, irrigation remains the agency's principal focus. In 1992, the agency redefined its mission from one of water development to one of water management.

The Bureau's projects affect downstream flow and water quality.³⁷ About 33 Maf (million acre feet) are diverted from the Columbia River for irrigation. About 14 Maf of this total are consumed—not returned to the river. Operation and configuration of the Bureau's irrigation projects affect fish species survival in many ways. Reservoir habitat replaces rivers, upstream passage is blocked, and downstream river flows are reduced by reservoir operations and irrigation diversions. Return flows may be impaired by sediment, agricultural chemicals, or temperature. Aquatic life can be killed by entrainment in diversions or other facilities.

The Bureau plays an important role in obtaining water from the upper Snake River for anadromous fish flows in the lower Snake and Columbia rivers. The Bureau is continuing to seek new sources of water to further strengthen its ability to provide 427 thousand acre-feet (kaf) under all water conditions.³⁸

Historically, the **Bureau of Land Management** (BLM) managed federal public lands to support mining, grazing, and timber harvesting activities. More recently, the Federal Land Policy and Management Act of 1976 (FLPMA)(43 U.S.C. § 1732 et. seq.), directs the agency to manage public lands for multiple uses, including fish and wildlife, recreation, watershed protection, and scenic values through the development of resource management plans. FLPMA directs the BLM to develop and maintain land use, or resource management plans, that adhere to multiple use and sustained yield principles. However, the newly recognized uses regularly conflict with historic uses. Some timber harvest and grazing practices are important contributors to watershed deterioration.

The **U.S. Forest Service** (USFS), under the United States Department of Agriculture, has also been directed to shift from single-purpose commodity production to multiple-use

³⁶ BOR (2000).

³⁷ Information about Reclamation project impacts comes from the NMFS Draft Biological Opinion on the Operation of the Federal Columbia River Power System at 6-27 (July 27, 2000).

³⁸ BPA, Corps, Bureau, Multi-Species Biological Assessment of the FCRPS at 3-13 (December 1999)

management of federal forest lands. The USFS has a mandate to “provide timber for the people” under the Organic Act of 1897 (16 U.S.C. §§ 473 to 482). This focus was shifted with the Multiple-Use Sustained Yield Act of 1960 (16 U.S.C. §§ 528 to 531) (MUSYA), which expanded the uses for which the USFS must manage national forest lands to include fish and wildlife resources, recreation, and watershed protection. In 1976, Congress passed the National Forest Management Act to define and clarify national forest management (16 U.S.C. §§ 1600 to 1614). This act directs the USFS to prepare land and resource management plans (LRMPs) for each national forest. The LRMPs must identify various uses and develop corresponding management guidelines, with the goal of supporting multiple uses and sustained yield. However, neither act prioritizes the specified uses, leaving the Forest Service to balance these often-conflicting uses. The Forest Service, an agency historically focused on managing national forests for timber production purposes, has discretion to make those land management decisions.

Recognizing the need to manage on an ecosystem basis and better coordinate efforts to improve watershed health, the USFS and BLM embarked on two recent efforts. First, in conjunction with the USFS, the BLM released “Rangeland Reform” in 1994, a plan to better coordinate land management between the agencies on federally owned rangelands in the West. The plan sets forth suggested changes to rangeland management, including the establishment of national grazing standards, limitations on the preference policy, and modifications to the makeup and authority of rangeland advisory councils authorized under FLPMA. While the BLM has adopted several of the changes in regulations, Congress has failed to enact legislation adopting Rangeland Reform. The USFS and BLM currently operate according to principles set out in their Inland Native Fish Strategy (INFISH) and Interim Strategies for Managing Anadromous Fish-Producing Watersheds in Eastern Oregon, and Washington, Idaho, and Portions of California (PACFISH).³⁹

Second, the Northwest Forest Plan represents an attempt to limit conflicts between timber harvest and species protection. Adopted by both the USFS and the BLM, the plan designates land under seven categories, and establishes standards and guidelines to regulate activity within these land areas. Of particular importance in the plan is the aquatic conservation strategy. This strategy, developed primarily to protect salmon and steelhead, consists of four main components: riparian reserves, key watersheds, watershed analysis, and watershed restoration. The aquatic conservation strategy sets forth restoration and maintenance criteria to maintain and improve fish habitat, riparian habitat, and water quality. This is accomplished through limiting potentially harmful activities near key watersheds, including timber harvest, road development, grazing, and mining.

³⁹ USDA/USFS Inland Native Fish Strategy (INFISH). Environmental Assessment, Decision Notice, and Finding of No Significant Impact: Interim Strategies for Managing Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada. Intermountain, Northern, and Pacific Northwest Regions (1995).

USDA/USFS and USDO/BLM. Decision Notice/Decision Record, Finding of No Significant Impact, and Environmental Assessment for the Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California [PACFISH]. Washington, DC (1995).

The USFS and the Bureau propose to develop and implement a coordinated, scientifically sound, broad-scale, ecosystem-based management strategy for lands they administer across parts of Idaho, Oregon, Montana, and Washington (approximately 63 million acres) (see Figure 2-12). The Interior Columbia Basin Ecosystem Management Project (ICBEMP) Supplemental Draft EIS presents three management alternatives for managing these important ecosystems.

Several additional federal agencies have limited land management authority. The **U.S. Department of Agriculture** (USDA), in addition to the USFS operations, manages numerous programs that provide incentives for modified agricultural land use. Important USDA programs are commodity programs, which were recently replaced by a system of market transition payments, and conservation programs. Conservation programs provide technical expertise, education and subsidies for a number of programs targeted at environmental quality. In 1985, Congress established the Conservation Reserve Enhancement Program (CREP), a voluntary program that uses financial incentives to encourage agricultural landowners to retire certain lands from production for a period of 10-15 years. In return, the landowners receive rental payments from the USDA. Both Oregon and Washington have entered into federal-state conservation partnerships under a newly funded phase of CREP that provide for the restoration of up to 100,000 acres of environmentally sensitive land. The state conservation enhancement programs will target revegetation, fencing, and other restoration of riparian areas bordering salmon-bearing streams.

Finally, the **Natural Resources Conservation Service** has responsibilities under the Soil and Water Resources Conservation Act of 1977 (16 U.S.C. § 2001) and the Farm Bills of 1994 (7 U.S.C. § 6962) and 1996 (7 U.S.C. § 7201). The NRCS works with local conservation districts to develop plans uniquely suited to individual landowners. The plans seek to reduce erosion, protect and conserve water resources, protect and enhance wetlands, and protect wildlife habitat.

In an effort to account for changing values and restore the ecological health of the river, Congress enacted several statutes that call for the Corps and/or the Bureau to consider fish and wildlife when operating water resource development projects. The Water Resources Development Act of 1986 (33 U.S.C. § 2263(a)) requires water resource managers to consider fish and wildlife conservation. The Water Resources Development Act of 1990 (33 U.S.C. § 2316(a)) places environmental protection as a “primary mission” of the Corps. However, Congress also stated that environmental protection should not interfere with the Corps’ preexisting duties of navigation improvements and flood control (33 U.S.C. § 2316(b)). Finally, in 1992, Congress passed the Reclamation Projects Reauthorization and Adjustment Act (43 U.S.C. § 371), which requires the Bureau to consider environmental protection and water quality at its water resource development projects.

2.3.2.3 Current Policies—Conflicting Priorities

The preceding sections have referenced the primary federal statutes and implementing regulations; the variety of federal agencies with interests in fishing and wildlife recovery efforts and with natural resource management in the Pacific Northwest; and the conflicts that have arisen as mandates change, as new information about species survival emerges, and as competition for project funding increases.

Some of the most critical inconsistencies or conflicts are shown in the table below.

Table 2.3-2: Conflicting Priorities

Policy Conflicts		
Policies that encouraged settlement and taking of tribal land	<i>versus</i>	Tribal treaties to preserve certain land for tribes
Policies that allowed depletion of fish runs		Tribal rights to fish for salmon
Policies that encouraged resource extraction and production—mining, hydropower development, USFS multiple use, BLM grazing, and homesteading		Later policies for environmental protection, including the ESA and CWA.
Acts that define the purposes and priorities of the Corps, Bureau, USFS, BLM, and BPA (in BPA's case, the Regional Act)		The ESA, which requires federal agencies to operate to protect endangered species
Federal treaties and state policies that allow harvest or indirect take of endangered species		The ESA, which prohibits take
Policies that recognize private property rights		ESA take and critical habitat provisions that limit private property rights
Policies to reduce costs and increase market forces in the power industry		Environmental policies (ESA, FERC, CWA) that increase costs and limit the flexibility of power producers and transmission providers to respond to market forces
Policies that support hatcheries for mitigation and lost harvest opportunity		Policies that discourage hatcheries that may compete with native fish
CWA dissolved gas standards		Spill to move fish down river
Protection of endangered species (e.g., salmon)		Protection of marine mammals (e.g., sea lions or seals)

These conflicts are further complicated by judicial rulings and changes in policy regarding federal Indian tribes and Indian resources, water resources, state harvest and hatchery policies, and the ESU policy of identifying endangered salmon species of fish by stocks. Also part of the equation are international treaties and other agreements

regarding Pacific salmon, and the requirement to consider funding as a resource that must also be managed in the growing era of deregulated energy supply.

Judicial Impact on Natural Resource Policy

The judicial branch of the federal government occasionally renders opinions that dramatically shape and define resource management policy. One notable example is Judge Malcolm Marsh's 1994 opinion in *Idaho Department of Fish and Game v. National Marine Fisheries Service*. At issue was the way in which the NMFS had prepared and issued its 1993 BiOp on FCRPS operations. In response, the Idaho Department of Fish and Game had brought suit claiming that NMFS BiOp was arbitrary and capricious. Ultimately, Judge Marsh ruled that NMFS was arbitrary and capricious in the way it constructed its 1993 BiOp on FCRPS operations.

Perhaps as important, Judge Marsh observed that "the underlying root of the litigation problem is the feeling of these parties that the federal government is simply not listening to them."⁴⁰ In subsequent cases, Judge Marsh has continued to remind the federal defendants of the need to coordinate more effectively with the state and tribal resource managers. Since then, the federal agencies in the region have engaged in numerous cooperative efforts with regional states and tribes, including the following: the Forum, the Council's Framework Process, the Council's Program amendment process, the Conceptual Plan/Basin-wide Strategy, and solicitation of comments from states and tribes on the draft 2000 hydrosystem BiOp (see Section 2.3.2.4). The success of these efforts has often been perceived differently by different participants.

In response to Judge Marsh's 1994 characterization of the NMFS' BiOp as simply tinkering when the hydrosystem "cried out for a major overhaul,"⁴¹ NMFS rewrote the Opinion, laying the groundwork for significant and far-reaching changes. These changes can be credited, at least in part, to Judge Marsh's ruling:

- While maintaining all flood control requirements, the priority of FCRPS operations has shifted to fish protection. Power production is secondary.
- Significant investments have been made in structural modifications at the dams to improve fish passage and survival.
- NMFS Draft White Papers provide PIT tag survival data that illustrate an upward trend in juvenile fish hydro system survival.⁴² Pit tag survival estimates for Snake River spring/summer chinook have increased from 32% in 1993 to the highest measured direct survival on record of 59% in 1998. During this period, NMFS'

⁴⁰ 850 Supp. 886, 900 (D. Or. 1994).

⁴¹ 850 Supp. 886, 900 (D. Or. 1994).

⁴² "PIT" tags, or "Passive Integrated Transponder" tags, enable researchers to track individual fish. NMFS, Passage of Juvenile and Adult Salmonids Past Columbia and Snake River Dams (1999b), pp. 71-72; NMFS Salmonid Travel Time and Survival Related to Flow Management in the Columbia River Basin, (1999a), p. 41.

aggressive actions have been taken on the hydro system to improve juvenile passage survival.⁴³

- Operations
 - On a 50-water-year average basis, 7.2 maf of flow augmentation is provided to enhance fish passage. This equates to approximately one-and-one-half times the storage capacity at Grand Coulee Dam.
 - On a 50-water-year average basis, about 1000 average megawatts (aMW) of energy are not generated, and are instead spilled during the April-through-August migration period to improve fish passage. This is equivalent to 10% of annual average federal generation, and almost enough energy to serve the city of Seattle for a year.
- Configurations
 - From 1996 - 1999, over \$342 million have been invested in actual structural modifications at the dams to improve passage conditions, as well as in studies and planning to support additional modifications that are underway, under development, or are currently under consideration.
 - The cumulative effect of these structural changes is a 30% decrease in turbine passage, which equates roughly to a 5% increase in fish survival at each dam.
 - Future configuration and survival improvements could draw from the strategies outlined in the Basin-wide Strategy paper (Federal Caucus, 2000b). Performance standards leading to recovery should be used to guide these efforts.
- Predation Management
 - Predator control actions throughout the FCRPS and the estuary save approximately 7 to 12 million smolts per year. This equates to approximately a 5 to 10% increase in juvenile fish survival.⁴⁴

Federal Indian and Indian Resource Policies

The judiciary played an important role in shaping federal resource policy in the series of opinions in the Indian treaty right fishing cases, culminating with *U.S. v. Oregon* and *U.S. v. Washington*. Beginning with decisions in the early 20th century, courts found that the Columbia River treaty tribes had reserved rights, included the following:

- the right of access to usual and accustomed fishing stations,
- immunity from state license requirements,
- up to half of the harvestable surplus of fish,
- restriction on when tribal fishing could be curtailed by states for conservation purposes, and

⁴³ Source: NMFS (1999b), pp. 71-72; and NMFS (1999a) p. 41.

⁴⁴ Source: NMFS (1999b), pp. 71-72; and NMFS (1999a) p. 41

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- recognition and enforcement of tribal water rights to flows for preservation of tribal fisheries.

Buttressed with these holdings, the federal government has taken the short next steps to establish a policy that Indian treaty fishing rights should take precedence over other competing uses that adversely affect treaty fisheries.

Federal policy related to Native American fish and wildlife issues in the Columbia Basin was greatly clarified during the 1990s. This clarification became possible, in part, with the issuance of an Executive Order in 1994 that directed all agencies to establish government-to-government relationships with federally recognized tribes for the purpose of consulting on plans, projects, programs, and activities the agencies might make that could affect tribal trust resources.⁴⁵

The Administration clarified its current policy with regard to the treaty and fisheries of the Columbia Basin tribes in a 1998 letter from NMFS that stated:

It is our policy that the recovery of salmonid populations must achieve two goals:
1) the recovery and delisting of salmonids listed under the provisions of the ESA;
2) the restoration of salmonid populations, over time, to a level to provide a sustainable harvest sufficient to allow for the meaningful exercise of tribal fishing rights. We see no conflict between the statutory goals of the ESA and the federal trust responsibility to Indian tribes.⁴⁶

In 1997, the Departments of Interior and Commerce jointly issued a Secretarial Order on American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act.⁴⁷ In that order, the Departments recognized:

[T]hat Indian lands, whether held in trust by the United States for the use and benefit of Indians or owned exclusively by an Indian tribe, are not subject to the controls or restrictions set forth in federal public land laws. Indian lands are not federal public lands or part of the public domain

The Departments shall conduct government-to-government consultations to discuss the extent to which tribal resource management plans for tribal trust resources outside Indian lands can be incorporated into actions to address the conservation needs of listed species

At the earliest indication that the need for federal conservation restrictions is being considered for any species, the Departments, acting in their trustee capacities, shall

⁴⁵ The White House, "Memorandum for the Heads of Executive Departments and Agencies, Government-to-Government Relations with Native American Tribal Governments" (April 29, 1994).

⁴⁶ Terry D. Garcia, Assistant Secretary for Oceans and Atmosphere, Department of Commerce, to Ted Strong, Executive Director, Columbia River Inter-Tribal Fish Commission (July 21, 1998).

⁴⁷ USDOl (U.S. Department of the Interior), Secretarial Order No. 3026 (June 5, 1997).
<http://endangered.fws.gov/tribal/Esatribe.htm>

promptly notify all potentially affected tribes, and provide such technical, financial, or other assistance as may be appropriate, thereby assisting Indian tribes in identifying and implementing tribal conservation and other measures necessary to protect such species. In the event that the Departments determine that conservation restrictions are necessary in order to protect listed species, the Departments, in keeping with the trust responsibility and government-to-government relationships, shall consult with affected tribes and provide written notice to them of the intended restriction as far in advance as practicable. If the proposed conservation restriction is directed at a tribal activity that could raise the potential issue of direct (directed) take under the Act, then meaningful government-to-government consultation shall occur, in order to strive to harmonize the federal trust responsibility to tribes, tribal sovereignty and the statutory missions of the Departments. In cases involving an activity that could raise the potential issue of an incidental take under the Act, such notice shall include an analysis and determination that all of the following conservation standards have been met: (i) the restriction is reasonable and necessary for conservation of the species at issue; (ii) the conservation purpose of the restriction cannot be achieved by reasonable regulation of non-Indian activities; (iii) the measure is the least restrictive alternative available to achieve the required conservation purpose; (iv) the restriction does not discriminate against Indian activities, either as stated or applied; and, (v) voluntary tribal measures are not adequate to achieve the necessary conservation purpose.

The last part of the directive quoted is called the Conservation Necessity Principle Analysis. Derived from judicial decisions in the *U.S. v. Oregon* and *U.S. v. Washington* series of cases, the conservation principles outline how, when, and why the government can limit tribal treaty fisheries. Appreciating that the Basin-wide Strategy Paper might include proposals that could affect these fisheries, NMFS performed a draft Conservation Necessity Principle Analysis on the federal Conceptual Plan. The analysis addresses each listed stock. The Basin-wide Strategy paper acknowledged that a conservation argument can be made for eliminating all harvest of this ESU. However, it does not recommend this action because the harvest rate is low and because it is important to maintain at least some tribal harvest pursuant to treaties and the federal trust obligation.⁴⁸

When BPA adopted its first tribal policy in 1996,⁴⁹ it was the first for which tribal participation had occurred prior to such adoption. Fundamental principles in the policy include the recognition of the unique character of each tribe, as a sovereign, and a commitment to government-to-government consultations to ensure consideration of tribal concerns before BPA takes actions that may affect tribal resources.

⁴⁸ NMFS, Draft Analysis of Restrictions on Tribal Fishing (2000b), pp. 5-6.

⁴⁹ USDOE/BPA (1996).

State Harvest and Hatchery Policies

Under production-focused fisheries management, many runs were purposefully harvested to extinction.⁵⁰ State and federal fisheries management agencies are now shifting from being production- and harvest oriented to being more conservation-minded. As noted in Washington's Draft Wildlife Fish Policy, "We know that in order to be successful, the resource must be our exclusive client."⁵¹ Initially, in its draft policy, Washington concluded:

We do not honestly believe that salmonid resource management can be successful in the future without recognizing our true client, stopping deliberate overfishing, marking all hatchery-origin anadromous salmonids released in state waters, curbing high peak flood flows, establishing higher spawning escapement objectives, correcting fishery selectivity, and markedly improving our delivery of viable wild salmonids to the spawning grounds.⁵²

A conflict in current fisheries management is whether to manage for native or non-native species. With the creation of reservoirs on the Snake and Columbia rivers has come the introduction and adaptation of non-native fish, particularly walleye and bass. These exotics not only compete with salmonids: they prey upon them. Oregon, Washington, and Idaho all must resolve the policy dilemma presented by the need to improve conditions for anadromous fish and the public desire to retain these newly established fisheries that hinder recovery efforts.

Reflecting a willingness to consider a change in policy direction, NMFS has now required BPA and the other action agencies to explore alternative harvest technologies that would permit the selective catching of non-listed stocks while avoiding take of listed stocks.⁵³

Catching fish has done more than just reduce overall numbers. Large mesh sizes in nets may have eliminated the largest, strongest, most fecund members of many salmon races.⁵⁴ Similarly, minimum length requirements for troll and sport fishers resulted in the

⁵⁰ "Many wild chinook and coho salmon populations carry the nomenclature tag of "secondary protection." What this means in plain language is deliberate, planned overfishing designed to harvest co-mingled hatchery fish. The logical end point is genetic extinction of wild fish—the same result already achieved in fact for lower Columbia River coho salmon. In their case, heavy overfishing began in the early 1960's." State of Washington, Wild Salmonid Policy, Draft Environmental Impact Statement, Recommended Alternative, p. 3 (April 2, 1997) .

⁵¹ State of Washington (1997), p. 3.

⁵² State of Washington (1997), p. 7. The Washington Fish and Wildlife Commission adopted a final policy on December 5, 1997.

⁵³ NMFS, Draft Biological Opinion on the Operation of the FCRPS, sections 9.6.3.1-9.6.3.4 (July 27, 2000).

⁵⁴ The average size of chinook salmon "has been declining since at least 1930, and continues to decline. Present average weights [in 1980] are half or less than half of those obtained 50 years ago." W.E. Ricker, "Causes of the Decrease in Age and Size of Chinook Salmon *Onchorhynchus tshawytscha*", Can. Tech. Rep. of Fish & Aquat. Sci. No. 944 (May 1980).

largest fish being kept, leaving the smaller fish to reproduce.⁵⁵ Fish managers have begun to adopt more of a role of resource trustees or conservators, but the transition is incomplete. They are still subject to interest group pressure to fish where fishing, by some measures, should not occur. Even sport fisheries where unmarked fish must be released have significant hooking mortalities ranging up to an estimated 30%.⁵⁶

Pacific Salmon Treaty

Since 1985, the United States and Canada have had a treaty to conserve Pacific salmon in order to achieve optimum production and to divide the harvests so each country reaps the benefits of its investment in salmon management. The effectiveness of this coordination to date is somewhat questionable. A recently re-negotiated treaty has been completed by the United States and Canada and will shift harvest from quota-based fishing to “abundance”-based fishing. The abundance approach is intended to give more protection to weaker, naturally produced stocks than the previous harvest agreement.

Hatchery Policies

Historically, hatcheries were inseparable from harvest. Until the last decade, hatcheries in the Pacific Northwest produced fish only for sport, commercial and tribal harvest. More recently, hatcheries have become tools for conservation and supplementation.⁵⁷ BPA implements a number of conservation hatchery programs, some of which (e.g., the program for Snake River Sockeye Salmon) keep the genomes alive in stocks that are extinct in the wild.⁵⁸

There are several clear movements in hatchery management: (1) a move to greater mitigation for tribal trust and treaty resources, which has moved some lower Columbia River hatchery fish production to up-river locations; (2) greater concern with fish health protocols and management of genetic traits affected by hatcheries; and (3) less emphasis on production purely for harvest and more concern about preserving weak populations. However, the region is still struggling between where and how to use hatcheries. Tribes, local governments, and industries want wider use of hatchery fish in order to boost spawning in the wild,⁵⁹ but state and federal fish managers want to further limit the use of the surplus upriver hatchery fish because in some instances they may be the progeny of distant downriver genomes.⁶⁰

⁵⁵ State of Washington (1997), p. 6 .

⁵⁶ State of Washington (1997).

⁵⁷ **Supplementation** - Artificial propagation intended to reestablish a natural population or increase its abundance. (Federal Caucus, 1999b, 1999, Glossary, p. 100).

⁵⁸ A detailed history and current status of hatcheries, emphasizing their roles for mitigation and production, can be found in the Federal Caucus' Conservation of Columbia Basin Fish (2000b) (“All-H” Paper) at pp. 52-66 and in the associated Hatchery Appendix.

⁵⁹ "(6) Briefs: Hydro System in Emergency Mode, and More," Public outcry over a plan to kill surplus hatchery fish in the Methow Valley has state and federal officials scrambling to salvage their salmon recovery effort. NWF.105/Jun.28.2000.

⁶⁰ See, NW Fishletter No. 056 (1998): "Imnaha Hatchery v. Wild Steel Head Dispute Temporarily Settled."

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In the Council's Program process, tribes especially continue seeking BPA implementation of mitigation through supplementation projects. The Nez Perce Hatchery, for instance, just began construction in the summer of 2000. The Yakama Nation is seeking to expand its Yakima Fisheries Project to include permanent production facilities for coho in addition to the facilities already existing for spring chinook. Most state and federal hatchery managers throughout the basin are also now looking to BPA to help them implement changes to reduce the adverse effects their existing facilities have on listed species.

However, NMFS' Final FCRPS BiOp places the BPA in a particularly difficult position regarding hatcheries. On the one hand, BPA cannot avoid jeopardizing the ESUs listed under the ESA without providing mitigation with conservation and supplementation hatcheries. On the other hand, NMFS believes that naturally spawning fish of hatchery origin can reduce the reproductive success of wild, naturally spawning fish. Thus, it is possible that the more BPA succeeds with supplementation hatcheries, the more it will be reducing the reproductive success of ESA-listed fish. Technical and policy decisions are needed to resolve this inherent conflict between hatcheries and wild fish survival.

Problems in Defining and Applying Listings

The ESA allows listing of "distinct population segments" of vertebrates as well as named species and subspecies. However, the ESA provided no specific guidance for determining what constitutes a distinct population. For Pacific salmon, NMFS has determined that a population (or group of populations) will be considered "distinct" (and hence a "species") for purposes of the ESA if it represents an ESU of the biological species. A population must satisfy two criteria to be considered an ESU: it must be reproductively isolated and it must represent an "important component" in the evolutionary legacy of the species.⁶¹ Application of this concept is flexible, depending in part on the information available. Where detailed information is available on a run of salmon it may often be split into many stocks for management purposes; but where information is lacking, a run may be comprised of several stocks that are lumped together. The stock concept, in theory, makes no allowance for the size of the actual local breeding population, (also called a "metapopulation structure"), in which populations consist of locally reproducing groups connected by some gene flow within a larger geographic area.⁶²

Between the local breeding population—such as the Red Fish Lake Sockeye—and the overall species—such as sockeye—is the realm in which the region must make its policy choices because while no *species* of salmon is near extinction, many wild *populations* are nearly so.⁶³ In essence, Pacific Northwest fisheries managers have taken a biologically cautious approach to ESA listings. Small populations of fish within a species have been

⁶¹ Waples, R. "Definition of "Species" Under the Endangered Species Act: Application to Pacific Salmon" (March 1991), NOA Technical Memorandum NMFST/NWC-194 at 1.

⁶² NRC (1995), pp. 70, 138-140.

⁶³ Lackey, R.T. "Salmon Policy: Science, Society, Restoration, and Reality," *Renewable Resources Journal* (1999a) 17(2):6-16 at 5.

listed for federal protection when, under a broader definition, the overall species itself is in no danger of extinction.

Problems in Working with Existing Water Policy

No resource is more critical in the West than water. The history of water use and development is, in many respects, the economic history of the West. In a significant respect, the settlement of the Columbia Basin did not end until 1993 when the state water agencies of Oregon, Washington, and Idaho closed the Basin's salmon streams to new water diversions.⁶⁴

The effect of water policy on the environment in the Pacific Northwest cannot be overstated. Prior appropriation, which is still the guiding principle of water rights law in Oregon, Washington, Idaho, and Montana, allows the first person that puts water to a beneficial use to then claim a right to that water as long as it continues to be used in the same time, place, and manner. Prior appropriation is the law regardless of whether new or subsequent beneficial uses of the same water might have greater social, economic, or cultural benefits. Consequently, traditional water uses and water law dating from the mid-19th century continue to dictate water law and policy today.

Water use and management policy is in flux. Many waters of the Pacific Northwest are over-appropriated—there are more rights to use water than there is water available to use. Tribes, such as the Nez Perce in Idaho, are suing to have their reserved water rights recognized and quantified. State courts are now adjudicating the rights of water users in two critical subbasins, the Yakima and the Snake river basins. Oregon, Washington, and Idaho are all operating under consent decrees with the EPA to establish total maximum daily load levels for the thousands of water bodies throughout the region that fail to meet CWA water quality standards. Economists and environmental organizations call for realigning water use policy more closely with economic value, but their efforts are still largely in the formative or experimental stages. While Oregon and Washington have now included instream flows for fish and wildlife as a statutory beneficial use, Idaho has not. The doctrine of prior appropriation still reigns in the Pacific Northwest, leaving those with the earliest recognized water rights largely in control of how that water will be used. Attempts by government entities to compel changes in water use by law are often countered with litigation and claims of unlawful takings that must be compensated as required by the Fifth Amendment of the United States Constitution.

Water management is primarily a matter of state jurisdiction. Nothing has yet brought the states of the Pacific Northwest together in a concentrated effort to address water issues comprehensively. Consequently, at best, water issues are addressed on a subbasin level through court-administered adjudications or local planning efforts such as those seen on the Deschutes and Yakima rivers. At worst, water issues fester, falling into an abyss of multiple rights and overlapping jurisdictions such that no one entity, save the courts, can effectively resolve them. But even the courts can only address one basin or

⁶⁴ Volkman, J, A River in Common: The Columbia River, the Salmon Ecosystem, and Water Policy (1997), p. 1.

issue at a time, as their jurisdiction and the claims before them allow. There is no widely accepted forum for getting all interested parties in one place at the same time to consider improvements to create coordinated regional water policy.⁶⁵

Managing the Money Resource

Current Provisions

Under the provisions of the Council's Columbia River Basin Fish and Wildlife Program or the BiOps for the FCRPS, BPA funds a substantial portion of the fish and wildlife recovery and mitigation efforts in the basin. BPA's funds—the ratepayers' funds—are the centerpiece of the world's largest, most expensive mitigation and recovery effort. Before the passage of the Regional Act in 1980, BPA used its broad general funding authorities to fund over \$200 million in mitigation projects. Since the passage of the Act and its express provisions requiring BPA to mitigate fish and wildlife, BPA has incurred costs of over \$3 billion. During the period from fiscal year 1996-2001, BPA's estimated costs are \$1.65 billion; for fiscal years 2001-2006 BPA estimates its costs in the neighborhood of \$2.4 billion.⁶⁶

These costs are not just direct expenditures such as those incurred through funding measures consistent with the Council's Program. BPA currently funds fish and wildlife activities under three categories:

Program	Expenses
1. Direct program	Direct expenses (not including capital debt service) of Council Fish and Wildlife Program measures.
2. Reimbursables	The money paid to the United States Treasury after-the-fact for fish and wildlife actions by other federal agencies. Reimbursables include fish and wildlife expenses of other federal agencies (Corps, Bureau, USFWS) that are to be repaid to the Treasury from power revenues. These expenses include interest and amortization on BPA's capital budget investments, operations and maintenance (O&M) assigned to power, and a portion of the Council's annual expenses.
3. River Operations	Foregone revenues and increased power purchases that occur as a result of operating the federal hydrosystem to enhance migration and habitat conditions for fish.

In 1996, the Department of the Army (for the Corps), the Department of Energy (for BPA), the Department of Interior (for USFWS and the Bureau) and the Commerce Department (for NMFS)—five federal agencies involved in salmon and other fish and wildlife restoration activities in the Columbia River Basin—executed a *Memorandum*

⁶⁵ Governance issues are discussed in more detail in Chapter 6.

⁶⁶ These estimates are found at BPA's Fish and Wildlife web site: : <http://www.efw.bpa.gov/>

of Agreement (MOA). This interagency MOA allows BPA (i.e., ratepayers) to maintain funding for Columbia Basin fish and wildlife activities, at an average of \$252 million per year plus the cost of system operations for fish (such as spill and flow augmentation) for fiscal years 1996 through 2001. The \$252 million consists of \$100 million for the direct fish and wildlife program, \$40 million for reimbursable expenses paid to other agencies, and \$112 million for debt service on capital investments such as bypass facilities and hatcheries.

The MOA represented an effort to balance the dramatically escalating costs of fish and wildlife restoration with the need to provide BPA with a degree of financial stability in a competitive energy market. It lasts only through 2001. Other obligations could be imposed on BPA during this period. The MOA also committed the federal agencies to collaborate much more closely with the region in developing federal funding requests. It incorporated an annex in which the parties agreed to collaborate in federal budget matters and in monitoring and evaluating fish and wildlife recovery. The agencies may enter into a new agreement for budget coordination beyond 2001. Table 2.3-3 shows BPA's estimate of costs under the MOA from 1996 through 2000.

Table 2.3-3: MOA Fish and Wildlife Program Expenses, 1996 – 2000

MOA Fish and Wildlife Program Expenses, 1996 – 2000, Million \$					
	Year				
Category	1996	1997	1998	1999	2000
Direct Program	68.5	82.2	104.9	108.2	106.1
Reimbursable	35.4	35.9	36.4	38.9	37.6
Expenses Assoc. with Capital Investments	73.1	76.3	74.1	76.0	70.0**
Hydro Operations	85.7	111.8	125.9	Not reported, and not expected to be derived	Not reported and not expected to be derived
Total	262.7	306.2	341.3		

** Estimated as of 11/2000. Source: Rollie Sivyer, BPA, 2000.

Costs of hydrosystem operations were not reported in 1999 and 2000. BPA incurs net costs from fish mitigation operations as the operations either: (1) change the timing of energy production within the year, or (2) reduce the total annual energy production from the Federal hydroelectric projects. It has been estimated that the BiOps have resulted in a loss of about 1000 aMW or 10% of the capability of the system.⁶⁷ Previous analyses estimated the 50-year annual average fish operation cost of the 1998 BiOp to be about \$180 million. This cost was based on a flat market price of \$20/MWhr.⁶⁸ Prices are expected to be higher than the price

⁶⁷ Columbia Basin Bulletin (12/22/2000), NMFS, Caucus Release Salmon Recovery Strategy.

⁶⁸ USDOE/BPA, 2000b: Costs of Implementing the 2000 Biological Opinion (Draft: 12/20/00).

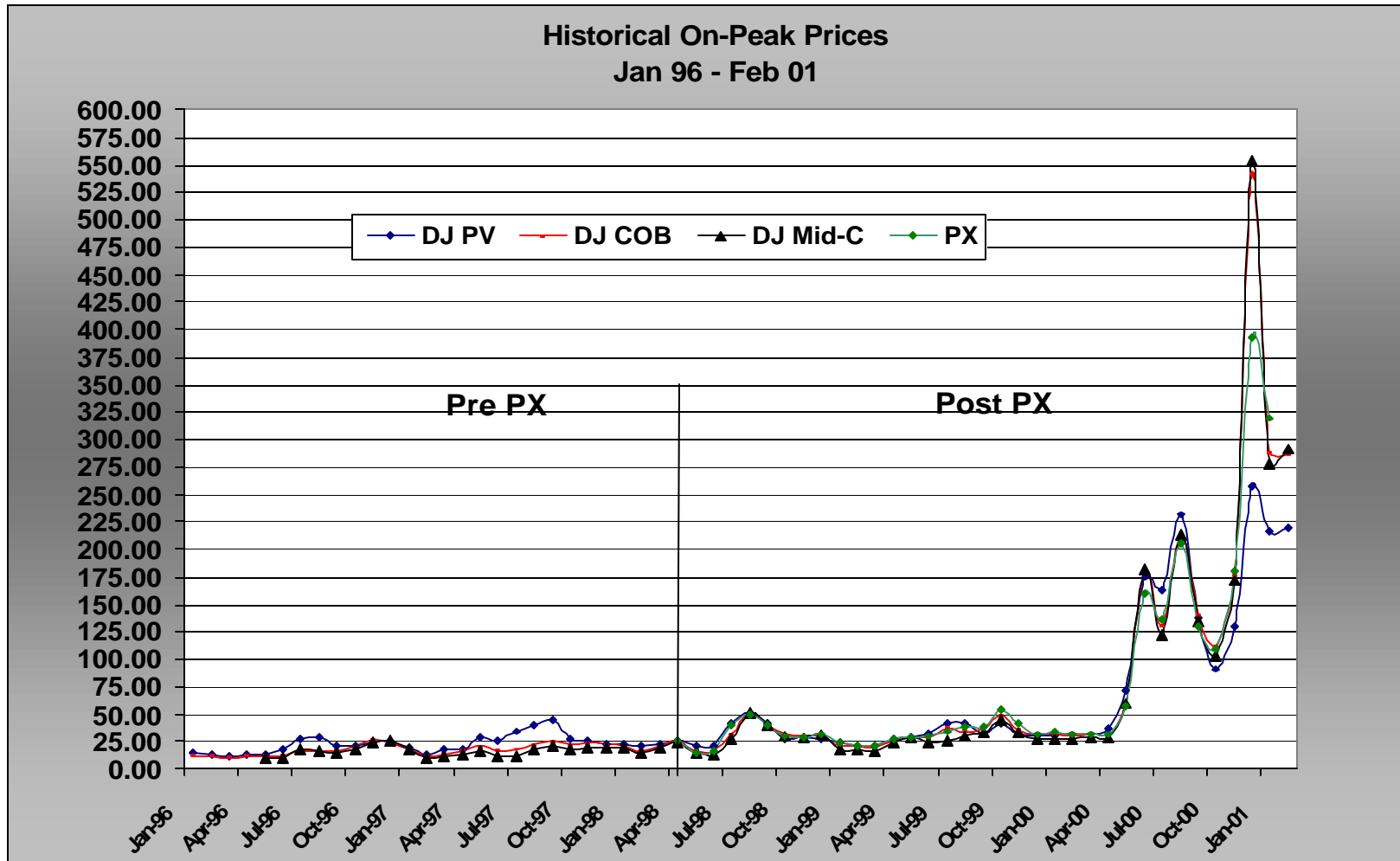
assumed in 1998. Figure 2-2 shows monthly average spot prices in regional power markets over the last 4 years. The price over the long-term is expected to be lower than recent highs but much higher than the 1998 price.

Actual costs in any future year will also depend on hydrologic conditions. Typically, in lower water years, the net costs are due primarily to purchases of energy required to offset the loss of generating capability as water is stored. In higher water years, the net costs are the result of revenues foregone, because the nonfirm energy could not be sold.

The Regional Act calls for the tracking of the monetary cost of purchasing replacement power and electric power losses resulting from implementation of the Council's Fish and Wildlife Program. BPA interprets the Act to allow it to recoup the amounts in excess of the power share of mitigation costs. Nevertheless, foregone revenues as a result of reduced energy production represent an additional cost to ratepayers because their power must be acquired from some other, usually more expensive source. Also, BPA may need to raise its rates later to cover costs. Furthermore, reduced revenues reduce BPA's ability to pay its debt, maintain reserves, and fund public benefits such as fish and wildlife mitigation and energy conservation programs. Foregone revenues have environmental costs as well because, as less energy is generated by the FCRPS, utilities obtain their energy from other sources that have environmental impacts such as depletion of non-renewable fuels and air pollution.

BPA is an unusual federal agency in that it receives no annual appropriations from Congress. Instead, Congress created the BPA Fund within the United States Treasury and gave BPA borrowing authority: a sort of credit card based on an indefinite revolving appropriation that lets BPA borrow from the Treasury, repay the debt with interest, and borrow against the balance again. BPA deposits the revenues from its power marketing activities into the Fund. BPA collects these funds from its customers—the ratepayers. BPA uses its revenue from ratepayers to repay the Treasury—the taxpayers—for the nation's financing of the construction and operation of the FCRPS and other capital programs such as transmission and energy conservation programs. Where this EIS refers to ratepayer dollars, this means the money generated by BPA through its power marketing activities.

Figure 2-2: Monthly Average Spot Market On-Peak Prices, January 1996 to February 2001, Four Markets



Where we refer to taxpayer dollars, we refer to dollars appropriated by Congress that will not ultimately be repaid to the Treasury by BPA; i.e., a cost borne by the taxpayers.

Fish and Wildlife Program costs paid by ratepayers and hydropower losses are not the only fish and wildlife costs in the region. Other costs are paid by federal taxpayers. Some of these fish and wildlife costs are difficult to estimate because the federal programs from agencies such as EPA, the Corps, and the Bureau include purposes other than fish and wildlife. Still, informal studies have found that these other federal costs may range into hundreds of millions of dollars annually.

Additional costs are paid by state and local taxpayers, and state and local funds are provided by lottery revenues, hunting and fishing licenses, use fees, and other sources.

Regulatory costs are paid by businesses and their customers, and additional losses are incurred by uses of public and private resources such as grazing and forestry, when use is restricted to help fish and wildlife. Still more costs are paid by tribes and by citizens as monetary contributions or as the value of time and resources contributed. The extent of these costs is unknown.

Challenges to Funding

For many years, the rates for BPA hydropower were modest in comparison to those for other sources. Still, hydropower revenues were sufficient to repay the federal debt from building the dams. Revenues have increased over time with demand, but so has the share of revenue allocated to purposes other than repayment. Especially, fish and wildlife costs have increased dramatically.

In the past, BPA was able to increase firm power rates to cover cost increases. Customers may not have welcomed rate increases, but the cost of BPA power even *with* rate increases was well below the cost of power from other suppliers. BPA's rate increases, therefore, did not significantly affect BPA power sales (see *Maximum Sustainable Revenue* definition, next page). More recently, however, a more competitive market has emerged for electric power, and non-BPA suppliers began to offer power products at prices comparable to BPA's rates.

In the BPA Business Plan EIS (DOE/EIS-0183, Sec. 2.6.1 and 4.4.1.2)⁶⁹, BPA explained how a highly competitive power market affects its rates. BPA was concerned that its rates, increased to cover costs of fish and wildlife and other public benefit programs, would become noncompetitive. If this were to occur, the agency would find it difficult to meet all of its power, financial and environmental responsibilities. BPA would be forced to implement one of its potential Response Strategies—to increase revenues, reduce costs, or transfer costs—to continue meeting its obligations. Since BPA would already

⁶⁹ USDOE/BPA (1995).

be at MSR, increasing revenues would be difficult. In addition, BPA had been cost-cutting over the past several years, so reducing costs much further would have adverse consequences.

***Maximum Sustainable Revenue (MSR).** When BPA's rates are close to the cost of alternative power supplies, there is a point at which an increase in BPA rates will not increase revenues. This is because the potential increase in revenues from the higher rate is affected by load loss as customers look elsewhere for cheaper power or a higher degree of certainty. The maximum sustainable revenue (MSR) occurs when the percent increase in BPA rates equals the percent reduction in quantity sold. The BPA rate at which MSR occurs and the amount of revenue at MSR are both positively related to power market conditions. If the market price for power drops below BPA's firm power rate, BPA will lose loads, revenues will decline, and BPA must reduce its rates to maximize revenue.*

BPA works to ensure that fish and wildlife funds are spent efficiently and costs are controlled. Still, fish and wildlife costs are expected to increase. Therefore, and depending on future power market conditions, some of the additional fish and wildlife costs may need to be transferred to others. Figure 2-3 illustrates this condition.

In addition, BPA is concerned about its customers' *perceptions* of BPA's costs. In numerous forums, customers said that if BPA's responsibilities lead to unpredictable rates, they would find other power supplies. The uncertainty regarding BPA's rates occurred partially because BPA's ultimate responsibility for fish and wildlife funding is not quantified. Without an end-point, the MSR problem becomes more likely.

BPA revenues, wholesale power prices, and growing demand also affect BPA's ability to pay fish and wildlife costs. Starting in October 2001, BPA's total commitments to firm loads will exceed the firm output of the FCRPS. To meet these loads, BPA is augmenting low-cost hydro with power purchases from the market. Because the cost of hydropower is consistently less than the cost of power from other sources, BPA's average cost is likely to be substantially lower than the prices of power from alternative suppliers. In fact, because BPA's low-cost hydro brings down the average cost of BPA's firm power, the higher the market price goes, the more attractive BPA's averaged cost power will become. If customers have a choice as to whether to take power from BPA, the higher the market price, the higher BPA's loads will be.

Currently, the risk of driving BPA customers to other sellers is much less than it was when the concept of Maximum Sustainable Revenues was first introduced. A more immediate concern is market volatility, which threatens the stability of the market and the financial health of participating buyers and sellers.

As studies for BPA's 2001-2006 rate case have shown, volatility in the price of purchased power can dramatically alter BPA's financial prospects, from accumulating

significant reserve funds to completely depleting previously accumulated reserves. If BPA's financial reserves become depleted, BPA might be unable to make its annual Treasury payment in full or on time, or to meet other financial obligations (including fish and wildlife implementation costs). Recent agreements with customers provide innovative terms that allow rate adjustments twice a year based on BPA's actual costs of power purchased to serve firm loads.

Deregulation, conditions in California and the western states, and uncertainty regarding the response of power producers and consumers adds another layer of uncertainty to BPA's revenues and ability to cover costs. Capacity shortages and increased volatility in West Coast electric power markets since June 2000 have resulted in unprecedented high prices throughout the western United States that have continued for months after seasonal peak loads. In California, high wholesale power prices, in conflict with statutory limits on retail prices, have left Independently Operated Utilities (IOUs) with billions of dollars in unrecovered costs. These deficits have led to defaults by those IOUs on payments due the California Power Exchange (PX) and the California Independent System Operator (ISO), which in turn have been unable to make full payments to power marketers.

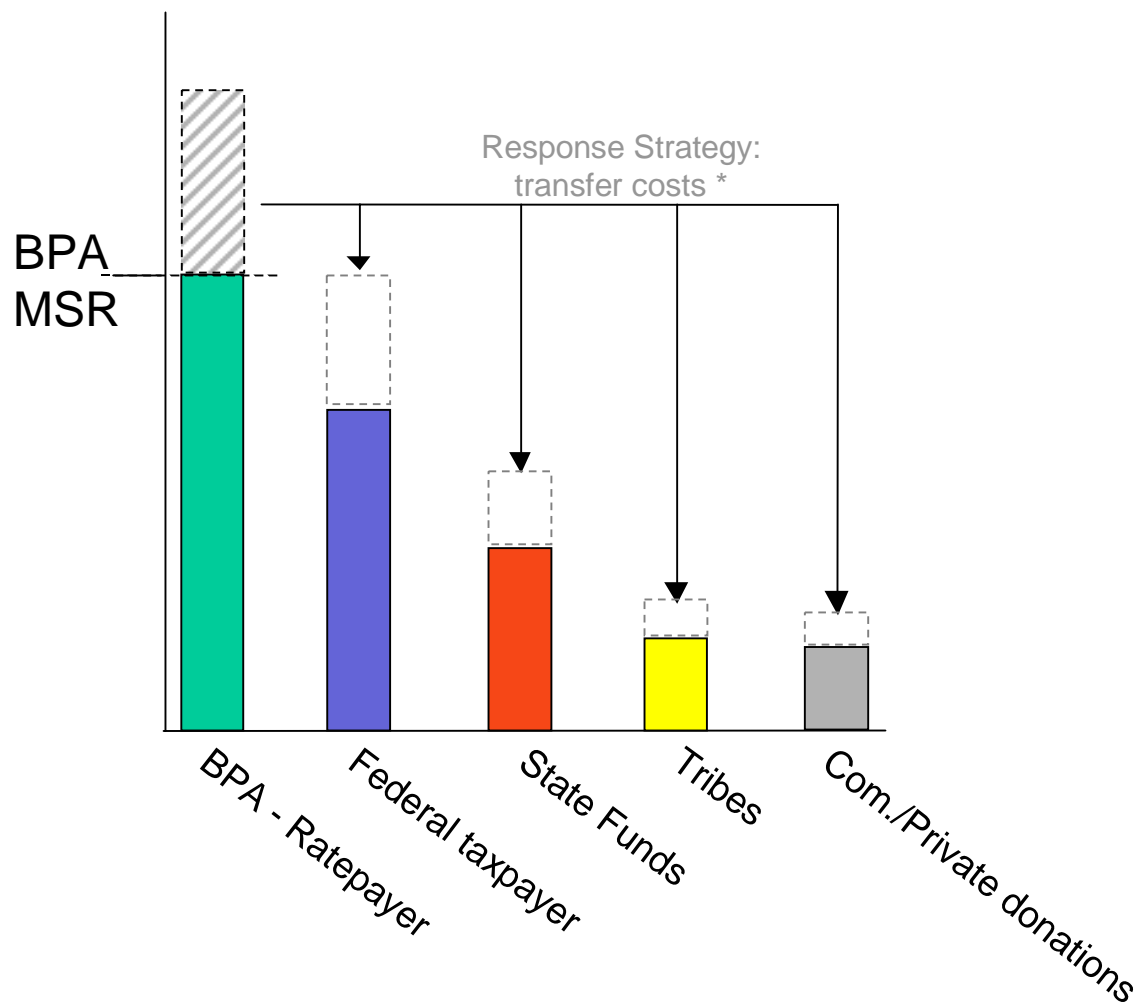
The lack of creditworthy buyers to purchase power for California loads has become a financial and operational crisis. Power generators and marketers are forced to choose between declining to provide power (out of legitimate concern that the buyer may be insolvent) and supplying power to avoid emergencies with little expectation of being paid. BPA has been called upon to provide power to California during one of the driest winter periods on record. As a result, when the weather has been coldest in the Pacific Northwest, under the terms of the Biological Opinion, requirements for Columbia River flows or elevations of FCRPS hydro projects have been modified. To the extent that these modifications get in the way of achieving the goals of fish and wildlife implementation, it is a consequence of market conditions arising from the breakdown of the California restructured electric power market.

In summary: high prices for power may impair BPA's ability to finance fish and wildlife implementation. Price volatility adds uncertainty about BPA's financial health. Extreme power demands or shortages may lead to modifications to fish and wildlife operations. Unprecedented conditions arising from generation shortages and high prices in California have created new risks and uncertainties for BPA and the FCRPS.

2.3.2.4 Initiatives to Modify the Current State

Despite the burgeoning environmental movement that began in the second half of the twentieth century—despite the acts and statutes passed, the programs undertaken, and the mitigation hatcheries built and operating—many fish and wildlife species have continued to decline in the Pacific Northwest. Some are in danger of extinction. More are listed as threatened or endangered every year. At the same time, programs have multiplied and authorities have overlapped. Socioeconomic objectives may compete with those focused on the natural world, of which humans are a part.

Figure 2-3: Illustration of a BPA Response Strategy When Reaching Maximum Sustainable Revenues (MSR)



* NOTE: For purposes of this illustration, the incremental differences are proportional to the pre-existing cost shares. In practice, the transfer costs increments may be affected by funding limitations, political considerations, and the Policy Direction ultimately selected.

On the plus side, in today's political environment, economic and environmental effects are considered together, and the public is actively engaged in government decisionmaking processes. Today's political environment contains all the elements that developed in the last 20 years: a complex of overlapping state, local, federal, tribal, private, interest group, and environmental interests and agendas. Each entity has its research, opinions, and priorities. But there are three dilemmas:

- There is no clear scientific proven answer regarding what single action or set of actions the region should take to protect and enhance fish and wildlife while preserving human uses.
- Priorities must be set because there is limited money available to fund what measures we can agree on.
- We must have a comprehensive approach, not one that narrowly limits itself to a focus on the hydro system and its operations.

Several major regional processes have or are developing their own alternatives to assist in species mitigation and recovery efforts in the region: "The Framework"⁷⁰, the Federal Caucus' Basin-wide Strategy paper, the Council's Program, BiOps or Habitat Conservation Plans on the FCRPS, plus several formal plans from various regional entities. These different processes are not fully coordinated.

Framework

As we noted in Chapter 1, the Forum (with representatives from the 4 Northwest states, 11 of the Columbia Basin tribes, and the federal agencies involved in the FCRPS) is designed to coordinate regional fish and wildlife policies of its members. The Forum's Multi-Species Framework workgroup was tasked with addressing fish and wildlife recovery and mitigation from a multi-species perspective and preparing a report on the process.

In October 1998, the Framework Project invited interested parties to submit "concept papers" describing general approaches to fish and wildlife recovery efforts in the Columbia River Basin. From more than two dozen concept papers in hand, the project managers distilled 108 individual fish and wildlife recovery strategies. These were further distilled into seven alternatives designed to represent an array of approaches, from managing the Columbia River for peak benefit for fish and wildlife to managing it for economic benefit. These alternatives formed the outline of the alternatives used in this DEIS. For more information, see, Northwest Power Planning Council, "The Year of The Decision"⁷¹ and Chapter 4 and **Appendix D** of this DEIS.

Federal Caucus and Basinwide Salmon Recovery Strategy.

Nine Federal agencies have joined together as a Federal Caucus to address those recovery options for endangered fish that simultaneously consider the needs of other aquatic

⁷⁰ A process no longer active.

⁷¹ Federal Caucus (2000b).

species. These agencies include BPA, NMFS, USFWS, the Bureau, the Corps, Bureau of Indian Affairs (BIA), USFS, BLM and EPA. The intent was to develop a response strategy that could guide the recovery of Columbia Basin salmon.

The Federal Caucus used these goals and objectives, modified based on comments from tribal governments and the public, to develop the Basin-wide Strategy.⁷²

Goals

- **Conserve Species.** Avoid extinction and foster long-term survival and recovery of Columbia Basin salmon and steelhead and other aquatic species.
- **Conserve Ecosystems.** Conserve the ecosystems upon which salmon and steelhead depend, including watershed health.
- **Assure Tribal Fishing Rights and Provide Non-Tribal Fishing Opportunities.** Restore salmon and steelhead populations over time to a level that provides a sustainable harvest sufficient to provide for the meaningful exercise of tribal fishing rights and, where possible, provide non-tribal fishing opportunities.
- **Balance the Needs of Other Species.** Ensure that salmon and steelhead conservation measures are balanced with the needs of other native fish and wildlife species.
- **Minimize Adverse Effects on Humans.** Implement salmon and steelhead conservation measures in ways that minimize their adverse socio-economic and other human effects.
- **Protect Historic Properties.** Consistent with the requirements of the National Historic Preservation Act and other applicable laws, assure that effects of recovery measures on historic properties are identified and addressed in consultation with all interested and affected parties.
- **Consider Resources of Cultural Importance to Tribes.** In implementing recovery measures, seek to preserve resources important to maintaining the traditional culture of Basin tribes.

Biological Objectives

- Maintain and improve upon the current distribution of fish and aquatic species, and halt declining population trends within 5-10 years.
- Establish increasing trends in naturally sustained fish populations in each subregion accessible to the fish and for each ESU within 25 years.
- Restore distribution of fish and other aquatic species within their native range within 25 years (where feasible).
- Conserve genetic diversity and allow natural patterns of genetic exchange to persist.

⁷² Federal Caucus (2000b).

Ecological Objectives

Prevent further degradation of tributary, mainstem and estuary habitat conditions and water quality.

- Protect existing high-quality habitats.
- Restore habitats on a priority basis.

Water Quality Objective

- In the long term, attain state and tribal water quality standards in all critical habitats in the Columbia River and Snake River basins.

Socio-Economic Objectives

- Select those actions to restore and enhance fish and their habitat that achieve the biological and ecological objectives at the least cost.
- Mitigate for significant social and economic impacts and explore creative alternatives for achieving these objectives.
- Seek adequate funding and implementation for strategies and actions.
- Coordinate restoration efforts to avoid inefficiency and unnecessary costs.
- Restore salmon and steelhead to population levels that will support treaty and non-treaty harvest.
- Select actions that consider or take into account tribal socio-economic or cultural concerns.

The agencies believe that their recommendations are the combinations most likely to meet these goals and objectives. The actions reflect the best scientific understanding of what is necessary to conserve the species and their ecosystems. The Strategy contemplates maintaining tribal fishing opportunities in the near term, and expanding them over time. The Strategy recognizes the needs of other at-risk fish, wildlife and plant species within the basin. The Strategy seeks to provide a measure of social and economic certainty by seeking maximum benefit from the available resources, with clearly established implementation and monitoring processes.

The federal agencies have entered into a Memorandum of Agreement (MOU) to formalize their commitment to coordinate their implementation, funding and monitoring of the Strategy and to ensure common approaches and priorities for the recovery of listed fish. A copy of a draft MOU is in Volume 2. Specifically the MOU commits federal agencies to:

- establish an expanded Federal Caucus;
- establish a Habitat Team;
- consistently apply ESA, CWA, other relevant statutes and tribal trust and treaty responsibilities as they relate to the conservation of Columbia Basin fish;

- establish priorities for implementation;
- coordinate budget development and expenditures;
- coordinate with related efforts of state, tribal and local governments; and
- work with the states, tribes and the Council to develop a comprehensive basinwide monitoring program.

The NMFS 2000 FCRPS Biological Opinion

The NMFS 2000 Federal Columbia River Power System Biological Opinion (FCRPS BiOp) documents interagency consultations pursuant to Section 7(a)(2) of the ESA.⁷³ The consultations considered 14 sets of dams, powerhouses, and associated reservoirs in the FCRPS and 19 Bureau projects in the Columbia Basin. The consultation considered whether the configuration, operation, and maintenance of these facilities were likely to jeopardize the continued existence of 12 species of fish listed under the ESA.

NMFS used a five-step approach to apply ESA Section 7(a)(2) standards developed in the 1995 FCRPS BiOp for Pacific salmon:

1. define biological requirements and current status;
2. evaluate the relevance of the environmental baseline to the species' status;
3. determine effects of proposed or continued actions on the listed species;
4. determine whether the species can be expected to survive with an adequate potential for recovery; and
5. when an action is expected to jeopardize the continued existence of a species or modify its critical habitat, develop reasonable and prudent alternatives.

The jeopardy analysis framework, including a jeopardy standard and metrics and criteria useful for assessing the jeopardy standard, are discussed. NMFS uses a standardized criterion of a 5-percent probability of absolute extinction in assessing whether each species has a high likelihood of survival under the proposed action. (Absolute extinction means that no more than one fish returns over the number of years in a generation). Recovery metrics are also discussed, and recovery population levels are provided.

The action agencies proposed to continue current FCRPS operations that implement the 1995 Reasonable and Prudent Alternative. NMFS concludes that this proposed operation and configuration of the FCRPS and Bureau projects are likely to jeopardize the continued existence of 8 of the 12 ESUs considered; the no-jeopardy findings are for the Lower Columbia and Upper Willamette Chinook Salmon and Steelhead trout.

The Reasonable and Prudent Alternative identified actions that, when combined with other ongoing and anticipated measures outlined in the Basin-wide Strategy, are likely to ensure a high likelihood of survival with a moderate-to-high likelihood of recovery.

⁷³ NMFS (2000b).

Proposed hydrosystem actions include enhanced spill and spillway improvements, improved flow management, physical improvements to passage facilities, increased use of barges and reduced use of trucks for summer migrants, and continued spill at collector projects.

A separate BiOp documents a similar consultation process for Bull Trout and Kootenai River White Sturgeon.⁷⁴ The USFWS finds that the proposed action will not jeopardize Bull Trout, but that it will jeopardize the Kootenai River White Sturgeon. The Reasonable and Prudent Alternative would modify operations at Libby Dam.

The Basin-wide Strategy is related to the BiOp in several ways. First, it provides an overall, conceptual recovery strategy for aquatic species affected by the FCRPS. Second, it shows how actions called for in the BiOp fit with other related recovery initiatives. Third, it provides a tool for engaging the public. Fourth, it provides a forum for federal agencies to plan and coordinate their activities.

Other Regional Plans

Each state in the Columbia River basin administers the allocation of water resources within its borders. In the past, each state's economy depended on natural resources, with intensive resource extraction and new irrigation development facilitated by federal land and water resource policies.

Water resource development has slowed in recent years. Most arable lands have already been developed, the increasingly diversified regional economy has decreased demand, and there are increased environmental protections. Growth in new businesses, primarily in the technology sector, is creating urbanization pressures and increased demands for buildable land, electricity, water supplies, waste-disposal sites, and other infrastructure. Economic diversification has contributed to population growth and movement in all four states, a trend likely to continue for the next few decades. Such population trends will result in greater overall and localized demands for electricity, water, and buildable land in the action area; will affect water quality directly and indirectly; and will increase the need for transportation, communication, and other infrastructure. The impacts associated with these economic and population demands will probably affect habitat features such as water quality and quantity, which are important to the survival and recovery of the listed species. The overall effect will be negative, unless carefully planned for and mitigated.

NMFS cooperates with the state water resource management agencies in assessing water resource needs in the Columbia River basin. Through restrictions in new water developments, vigorous water markets may develop to allow existing developed supplies to be applied to the highest and best use. Interested parties have applied substantial pressure, including ongoing litigation, to the state water resource management agencies to reduce or eliminate restrictions on water development. It is, therefore, impossible to predict the outcomes of these efforts with any reasonable certainty.

⁷⁴ USDOI/USFWS (2000).

The region has several other major plans related to fish and wildlife mitigation and recovery efforts that this DEIS incorporates by reference. These plans represent a formal set of actions reflecting more localized social values than the legal parameters. The effect on these plans can also inhibit or enhance implementation of any policy direction but they too can be changed to reflect changing values. These plans include the Spirit of the Salmon (CRITFC, 1996), the Governors' Recommendation for the Protection and Restoration of Fish in the Columbia River Basin, the Council's Fish and Wildlife Program (Phase I amendments October 2000; Council, 2000c), the Interior Columbia Basin Ecosystem Management Project (USDA/USFS and USDO/BLM, 2000) and the Northwest Forest Plan (USDO/USFWS and BLM, 1994), and the Lower Snake River Juvenile Salmon Migration Feasibility Report EIS (Corps, 1999a).

State Plans

The four Northwest states are represented through the Council and have participated in the Council's Multi-Species Framework process. The governors of the region have also prepared a statement entitled "Recommendations of Governors of Idaho, Montana, Oregon, and Washington for the Protection and Restoration of Fish in the Columbia River Basin,"⁷⁵ which outlines their preferred strategy for recovery efforts.

The Governors' recommendations include the following general actions:

1. Habitat Reforms

- a) Designate priority watersheds for salmon and steelhead.
- b) Provide local watershed planning assistance and develop the priority plans by October 1, 2002, and the plans for all Columbia River basin watersheds by 2005.
- c) Integrate federal, state, and regional planning processes with the Council's amended Fish and Wildlife Program.
- d) Cooperate with federal, tribal, and local governments to implement the National Estuary Program for the lower Columbia River estuary, including creation of salmon sanctuaries.

2. Harvest Reforms

- a) Research the use of more selective fishing techniques and a license buyback program.
- b) Increase harvest selectivity through restrictions of harvest rates, gear, and timing for commercial and non-Treaty sport fisheries, consistent with ensuring survival of the species when combined with other recovery actions.
- c) Establish terminal fisheries below Bonneville Dam and in zone 6.

⁷⁵ Governors (2000).

- d) Strengthen state law enforcement programs and coordinate them with habitat strategies to aid specific watersheds.
- e) Increase fishing opportunities for species that prey on, and compete with, salmon for food.

3. Hatchery Reforms

- a) Implement reforms recommended in the Council's 1999 Artificial Production Review Report to congress.
- b) Support the region's fish managers and the tribes' development of a comprehensive supplementation plan that includes intensive monitoring and evaluation.
- c) Mark hatchery fish that pose threats to listed fish, consistent with the Pacific Salmon Treaty.

4. Funding and Accountability

- a) Seek funding assistance for existing activities designed to improve ecosystem health and fish and wildlife health and protection.
- b) Work regionally to create a standardized and accessible information system to document regional recovery progress.

Idaho, Montana, Oregon, and Washington each set rules and regulate the harvest of fish and wildlife through the sale of fishing and hunting licenses. State departments of fish and wildlife also maintain programs designed to conserve endangered species and their habitat. In addition to these programs and those that the states operate through the Council's Fish and Wildlife Program, several states have adopted individual plans and programs for fish and wildlife mitigation and recovery.

The State of Idaho Department of Fish and Game (IDFG) has released its report on "Idaho's Anadromous Fish Stocks: Their Status and Recovery Options."⁷⁶ This report examined the three recovery options being considered by NMFS for Idaho's salmon and steelhead: 1) Status quo smolt barging and flow augmentation; 2) improved smolt barging and additional flow augmentation; and 3) natural river in the Lower Snake River between Lewiston and Pasco and existing or reduced flow augmentation. IDFG staff recommended that "the natural river option is the best biological choice for recovering salmon and steelhead in Idaho." The State of Idaho and IDFG Commission have adopted a "normative river standard... [that] requires phasing out smolt transportation and allowing smolts to migrate naturally in the river as river conditions improve."⁷⁷

⁷⁶ The report on Idaho's anadromous fish stocks was completed May 1, 1998. A second printing was released June 8, 1998. IDFG (Idaho Fish and Game), "Director's Letter," June 8, 1998, page 1.

⁷⁷ IDFG (1998). Idaho's Anadromous Fish Stocks: Their Status and Recovery Options. Conclusions, page 1.

The state of Idaho has created an Office of Species Conservation to work on subbasin planning and to coordinate the efforts of all state offices addressing natural resource issues. The state actions targeted by this office include the following:

1. continue diversion screening, in cooperation with BPA and the Bureau;
2. improve flow augmentation for fish passage through state programs;
3. implement the Forest Practices Act to maintain forest tree species, soil, air, and water resources and provide a habitat for wildlife and aquatic life;
4. complete cumulative watershed effects assessments on more than 100 watersheds to support watershed planning; and
5. require 30-foot buffers along Class II streams.

The State of Oregon has created "The Oregon Plan," which emphasizes coho salmon in coastal river basins. The goal of the plan is to restore salmon and trout populations and fisheries "to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits...[T]he Oregon Plan involves the following: (1) coordination of effort by all parties, (2) development of action plans with relevance and ownership at the local level, (3) monitoring progress, and (4) making appropriate corrective changes in the future."⁷⁸

The Oregon Plan includes the following programs designed to benefit salmon and watershed health:

- Oregon Department of Agriculture water quality management plans; Oregon Department of Environmental Quality development of total maximum daily loads (TMDLs) in targeted basins; implementation of water quality standards Oregon Watershed Enhancement Board funding programs for watershed enhancement programs, and land and water acquisitions;
- ODFW and Oregon Water Resources Department (OWRD) programs to enhance flow restoration;
- OWRD programs to diminish over-appropriation of water sources;
- ODFW and Oregon Department of Transportation programs to improve fish passage; culvert improvements/replacements;
- Oregon Department of Forestry state forest habitat improvement policies and the Board of Forestry pending rules addressing forestry effects on water quality and riparian areas;
- Oregon Division of State Lands and Oregon Parks Department programs to improve habitat health on state-owned lands; and
- Department of Geology and Mineral Industries program to reduce sediment runoff from mine sites; and

⁷⁸ "The Oregon Plan: Overview" <<http://www.oregon-plan.org/>>

- state agencies funding local and private habitat initiatives; technical assistance for establishing riparian corridors; and TMDLs.

The State of Washington has published its "Statewide Strategy to Recover Salmon."⁷⁹ The goal of the plan is to "restore salmon, steelhead, and trout populations to healthy harvestable levels and improve those habitats on which the fish rely."⁸⁰ The Statewide Strategy focuses on salmon, but also emphasizes the need to maintain an adequate and clean water supply that sustains people, fish and wildlife. The Governor's Salmon Recovery Office has identified seven "salmon recovery regions" where state and local governments, tribes, business groups, and citizens work together to monitor habitat conditions, collect data, and implement habitat restoration projects appropriate to the regional environment and local needs.

Washington's Department of Fish and Wildlife (WDFW) and tribal managers have been implementing the Wild Stock Recovery Initiative since 1992. The managers are completing comprehensive species management plans that examine limiting factors and identify needed habitat activities. The plans also concentrate on actions in the harvest and hatchery areas, including comprehensive hatchery planning.

Washington State closed the mainstem Columbia River to new water rights appropriations in 1995. All applications for new water withdrawals are being denied, based on the need to address ESA issues. The state established and funds a program to lease or buy water rights for instream flow purposes. This program, begun in 2000, is in the preliminary stages of public information and identification of potential acquisitions.

The Watershed Planning Act, passed in 1998, encourages voluntary planning by local governments, citizens, and tribes for water supply and use, water quality, and habitat at the Water Resource Inventory Area or multi-Water Resource Inventory Area level. Grants are made available to conduct assessments of water resources and to develop goals and objectives for future water resources management. The Salmon Recovery Funding Act established a board to localize salmon funding. The Board will deliver funds for salmon recovery projects and activities based on a science-driven, competitive process.

Washington State's Forest and Fish Plan may be promulgated as administrative rules. Those rules are designed to establish criteria for non-Federal and private forest activities that will improve environmental conditions for listed species. The Washington legislature may amend the Shoreline Management Act, giving options to local governments for complying with endangered species requirements in marine areas. The state is also establishing the Lower Columbia Fish Recovery Board to begin drafting recovery plans for the lower Columbia region. The future impacts of

⁷⁹ State of Washington (1999).

⁸⁰ Extensive information on Washington's salmon recovery efforts is available at:
<<http://www.wa.gov/wdfw/recovery.htm>>

the Board's efforts will depend on legislative and fiscal support. The Washington Department of Transportation is considering changing its construction and maintenance programs to diminish effects on stream areas and to improve fish passage. The program may qualify for a limit under NMFS' 4(d) rule to conserve listed species.

The state of Washington is under a court order to develop TMDL management plans on each of its 303(d) water-quality-listed streams. It has developed a schedule that is updated yearly; the schedule outlines the priority and timing of TMDL plan development.

Tribal Plans

In 1996, the Nez Perce, Umatilla, Warm Springs and Yakama tribes⁸¹ composed a joint restoration plan for anadromous fish in the Columbia River Basin. This plan, called Wy-Kan-Ush-Mi Wa-Kish-Wit, or "Spirit of the Salmon":

" . . . provides a framework for restoring anadromous, or sea-going, fish stocks, specifically salmon, Pacific lamprey (eels), and white sturgeon in upriver areas above Bonneville Dam. The plan's geographic scope of the plan extends wherever these fish migrate and throughout the Columbia River Basin wherever activities occur that directly affect them."⁸²

The plan's objectives are to halt the decline of salmon, lamprey and sturgeon populations above Bonneville Dam within seven years, to rebuild salmon populations to annual run sizes of four million above Bonneville Dam within 25 years in a manner that supports tribal ceremonial, subsistence and commercial harvests, and to increase lamprey and sturgeon to naturally sustaining levels within 25 years in a manner that supports tribal harvests. To achieve these objectives, the plan emphasizes strategies and principles that rely on natural production and healthy river systems.

The first volume of the two-volume plan sets out 13 scientific hypotheses and the recommended actions associated with each, along with 10 institutional recommendations. The second volume contains subbasin-by-subbasin return goals and the watershed restoration actions that must be undertaken to achieve them.

The technical recommendations, which are aimed at increasing survival at each stage of the salmon's life cycle, are presented as scientific hypotheses that summarize various restoration problems. Organized by salmon life cycle stages, each hypothesis proposes near- and long-term actions, identifies expected results, and names the institutional and decisional processes required to carry out the recommended actions.

⁸¹ These four tribes, which comprise the Columbia River Inter-Tribal Fish Commission, have Treaty rights to harvest Columbia Basin anadromous fish.

⁸² CRTFC, "Spirit of the Salmon" (Wy-Kan-Ush-Mi Wa-Kish-Wit) Executive Summary (1999), p 3.

The plan's technical recommendations cover hydro operations on the mainstem Columbia and Snake rivers; habitat protection and rehabilitation in the basin above Bonneville Dam, in the Columbia estuary and in the Pacific ocean; fish production and hatchery reforms, and in-river and ocean harvests.

The Nez Perce, Warm Spring, Umatilla, and Yakama tribal governments officially approved Wy-Kan-Ush-Mi Wa-Kish-Wit in January and February 1996. The tribes are now seeking to implement salmon restoration in conjunction with the basin's other sovereigns—the states, other tribes and the federal government--and in cooperation with their neighbors throughout the basin's local watersheds and other citizens of the Northwest.⁸³

Tribal plans also rest in part on the ongoing results of *U.S. v. Oregon*, discussed in Chapter 1. This case, begun in the 1968 by the Columbia River treaty tribes and the United States against Oregon, and (eventually) Washington and Idaho, supports the tribes' treaty-secured fishing rights. Under it, the tribes ultimately won recognition of their right to an even split of the harvestable fish between treaty and non-treaty fisheries and acceptance as fisheries co-managers. The Columbia River Fish Management Plan addresses issues such as the allocation of state and tribal harvests, fishing seasons, hatchery production, hatchery locations, and disposition of surplus returning adult salmonids of hatchery origins. The last plan expired in 1998 and has not been renegotiated yet.

In addition, several of the Basin's thirteen federally recognized tribes have been developing, as part of the Multi-Species Framework process, a statement entitled "The Tribal Vision for the Columbia River and How to Achieve It." This document emphasizes the following key elements of the tribes' philosophical approach to fish and wildlife mitigation and recovery:

"Tribal cultures, economies, religions, and ways of life throughout the Columbia River Basin are endangered no less than our air, water, fish, wildlife, plants and other resources – they depend on them, and cannot exist in their absence."⁸⁴

"The tribal vision for the future:

- is one in which people return to a more balanced and harmonious relationship with the environment
- is one where people, fish, wildlife, plants and other natural and cultural resources are once again biologically healthy and self-sustaining
- [includes] a healthy Columbia River Basin ecosystem also characterized by clean air and clean water

⁸³ CRTFC *Spirit of the Salmon* (Wy-Kan-Ush-Mi Wa-Kish-Wit) Executive Summary (1999).

⁸⁴ CRTFC, *The Tribal Vision for the Future of the Columbia River Basin and How to Achieve It* (1999) pp. 2-3.

- not only supports viable and genetically diverse fish and wildlife resources that provide direct benefits to society, through harvest and improved physical health of tribal and non-tribal members, but also nourishes the spirit
- [is one in which] tribal sovereignty, treaty rights and trust responsibility are honored, respected, and fulfilled.”⁸⁵

Strategies for achieving this vision include the following:

- Emphasize healthy rivers and watersheds with abundant and diverse species assemblages and their management, maintenance and restoration, with particular attention to ecosystem diversity, productivity and stability.
- Emphasize natural production provided by such rivers and watersheds.
- Reintroduce and restore anadromous fish to the rivers and streams that historically supported them, in numbers sufficient to provide for the needs of the ecosystem and people, in perpetuity.⁸⁶

2.3.2.5 Back to the Beginning: The Policy Decisions Change Over Time

Policy decisions, like the environment they address, are dynamic and change over time. The intent of this DEIS is to show the many policy choices and their consequences. There will, however, be no one right choice for all agencies or constituents.

“Society weighs policy choices in the context of prevailing values and preferences. Even with identical scientific information and the identical conditions of stocks, a salmon policy position from the end of the nineteenth century doubtless would be different than a current policy on salmon.

...

“The search for the scientifically optimal policy solution will be futile because of changing values and preferences.”⁸⁷

As evidenced by the example of Department of the Interior positions shown below, policies change, even within a single entity.

⁸⁵ CRITFC (1999a), p. 3.

⁸⁶ CRITFC (1999a), p. 5.

⁸⁷ Lackey, R. T. " The Savvy Salmon Technocrat: Life's Little Rules." *Environmental Practice*. 1(3):156-161 (1999b).

Department of the Interior, 1946
<i>“At the outset [the Department of the Interior] acknowledges that the decision must be made by Congress, with the thoughtful attention to the sentiment of the people of the region. The Department agrees that interests of the Columbia River fisheries should not be allowed indefinitely to retard full development of the other resources of the river. [The Department] concludes moreover that the overall benefits to the Pacific Northwest from a through going development of the Snake and the Columbia are such that the present salmon run must, if necessary, be sacrificed. This means to the Department that the Government’s efforts should be directed toward ameliorating the effect of an ultimate, and inevitable full development of the river’s resources upon the immediately injured interests and not toward a vain attempt to hold still the hands of the clock.”⁸⁸</i>

Department of the Interior, 1999
<i>“It is clear in our assessment that [drawdown of the four Lower Snake River dams] would provide many more benefits to fish and wildlife than the other alternatives. . . . Also, we believe [drawdown] would best increase survival of juvenile anadromous fish. . . . [I]t is the only alternative that addresses restoration of natural or near natural riverine conditions which would produce a myriad of positive influences on natural processes and fish and wildlife. Therefore, based on our biological evaluation of the [Corps of Engineers’ Lower Snake River Feasibility Study Draft EIS], the U.S. Fish and Wildlife Service concludes that the benefits to fish and wildlife from [drawdown] exceed the benefits provided by the other alternatives.”⁸⁹</i>

Such examples serve as a reminder that policies are temporal and transient. An agency’s policy choice today may be the source of the problems future generations are trying desperately to solve. Given the multitude of variables, interests, and the impossibility of keeping current on all the potential effects from a policy decision, this DEIS can only inform what decisions are made. It cannot predetermine what decisions should be made, who should make them, or how they should be implemented.

2.4 EXISTING ENVIRONMENTAL CONDITIONS

This section is intended to provide the reader with a basic understanding of existing environmental conditions. Much of the information is summarized from the environmental documents incorporated by reference, especially the SOR Final EIS, the BPA Business Plan EIS, the Corps Lower Snake River Juvenile Salmon Migration Feasibility Report/EIS, and the Interior Columbia Basin Supplemental Draft EIS. Other sources include the Federal Caucus Conceptual Plan and Basin-wide Strategy papers, the Human Effects Analysis of the Multi-Species Framework Alternatives (2000), the U.S. Department of Commerce's Statistical

⁸⁸ Bessey, R.F. Department of the Interior Pacific N.W. Coordination Committee at 22-23. "Minutes of the Meeting of the Columbia Basin Inter-Agency Committee Vol. 2" (June 25-26, 1947).

⁸⁹ USDO/USFWS, Draft Coordination Act Report on Snake River Feasibility Study (1999), at M ES-2.

Abstract of the United States (1999), and the USDA's Agricultural Statistics (2000).

2.4.1 Natural Environment

The Pacific Northwest's tremendous wealth of natural resources sustained native people for centuries and contributed to immigration that has lasted for more than a century. The settlement and development of the region brought changes to the natural environment that have culminated in the environmental conditions existing today.

The discussion of the existing natural environment described in this section is organized by these categories:

- air quality;
- water use and water quality;
- aquatic biological resources, including aquatic and riparian ecosystems and all fish using the Columbia Basin for any part of their life cycle;
- land use and quality; and
- terrestrial biological resources, including upland forests, grasslands, and wildlife.

2.4.1.1 Air Quality

Generally, the Pacific Northwest region is known for its excellent air quality. Areas close to the coast, where much of the population lives, normally have good air dispersion. Some interior areas are more subject to air quality problems in the summer and fall because of dry climates and proximity to large areas of exposed and highly erodible soils.

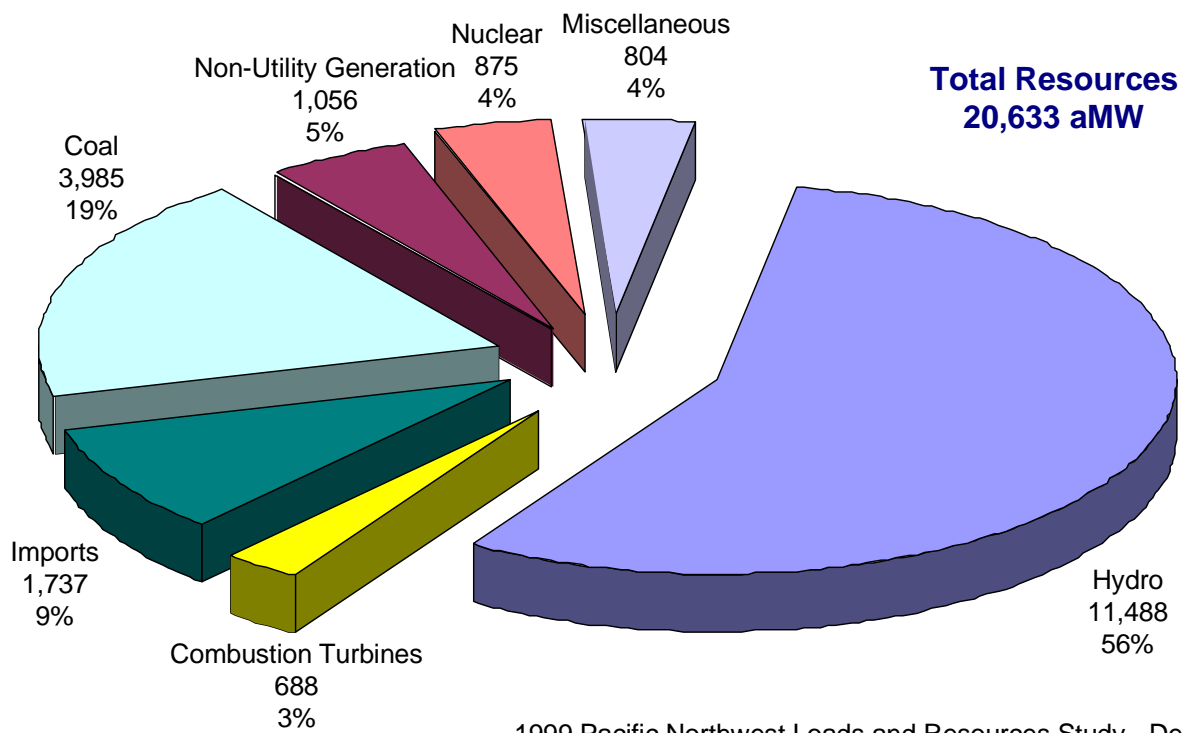
The Columbia River SOR identifies three major categories of pollutants 1) urban sources, 2) major single-point emitters, and 3) large areas of exposed soils. Important sources of urban air pollution include internal combustion engines used for transportation, industrial plants, burning of fuels for heating and other purposes, and burning of wastes. Single-point emitters include combustion turbines located in urban and rural areas. Most areas of exposed soils are agricultural and grazing lands and unpaved roads.

Important coal-fired plants are located near Centralia, Washington, and Boardman, Oregon. Sulfur dioxide is an important concern for coal-fired plants; nitrogen oxides are more of a concern for natural gas combustion turbines. Figure 2-4 shows the breakdown of the generation resources projected for operation in the 2000-2001 operating year. Figure 2-5 identifies Non-Hydro Generation sites in the region (see also **Appendix E: Energy Generation Facilities**). Figure 2-14 shows the location of major gas pipelines that which would help supply the fuel supply for any new gas combustion turbines.

Some areas in the basin do not fully meet federal, state and local Ambient Air Quality Standards. Some urban areas do not meet carbon monoxide standards, but the most

**Figure 2-4: Projected Regional Firm Resources
Operating Year 2000-2001**

(Based on 12-Month Average and 1936-37 Water Conditions)



1999 Pacific Northwest Loads and Resources Study - Dec. '99

common types of non-attainment in the region involve small particulate matter and total suspended particulates. Non-attainment areas for particulates include Sandpoint, Clarkston, and Lewiston. See Figure 2-5 for a map showing Air Non-Attainment and Class I Areas.

2.4.1.2 Water Use and Quality

Water use is the diversion or instream application of water to human uses, including agricultural irrigation, other water supply, hydropower, navigation, and waste disposal.

“Large hydroelectric dams on the main-stem and major tributary sections of the Columbia and Snake river systems present barriers to salmon, lamprey, and white sturgeon movements and alter river flow rates and patterns to the detriment of many fish populations. . . . Hydropower dams on the Columbia and Snake rivers have blocked and inundated mainstem habitat, altered natural flows for fish and aquatic species, impeded passage of migrating fish, and created a series of pools where fish predators reside.”⁹⁰

“Millions of acres of land in the basin are irrigated. Although most withdrawn water eventually returns to streams from agricultural runoff or from ground water recharge, crops consume much of the water. Withdrawals affect seasonal flow patterns by removing water from streams in the summer (mostly May-September) and restoring it to surface streams and ground water in difficult-to-measure ways.”⁹¹

Water quality problems generally originate as intentional use of water for waste disposal, or as non-point sources. Non-point sources include irrigation return flows, forestry practices, malfunctioning septic systems, urban runoff and mining leachates. Some water quality problems are directly related to dewatering of streams for irrigation and other water supply purposes.

“Withdrawing water for irrigation, urban and other uses can increase temperatures, smolt travel time, and sedimentation. Runoff from irrigation can introduce nutrients and pesticides into streams and rivers.”⁹²

“A 1992 survey of Washington rivers classified 54% of them as not fully supporting designated beneficial uses because of various types of pollution and degradation.”

“Until secondary sewage treatment began in the 1950's, large quantities of organic wastes from agricultural and urban operations greatly reduced the water quality along the Willamette River.”

“Columbia River streams, both mainstem and tributaries, have been designated as water quality limited under the Clean Water Act. The degraded condition of these streams is directly related to declining fish populations throughout the basin.”⁹³

⁹⁰ Federal Caucus (1999b), pp. 1-2.

⁹¹ Federal Caucus (1999b), p. 28.

⁹² Federal Caucus (1999b), pp. 28-29.

"Water quality in streams throughout the Columbia River Basin has been degraded by human activities such as dams and diversion structures, water withdrawals, farming and grazing, road construction, timber harvest activities, mining activities and urbanization. Over 2,500 streams and river segments and lakes do not meet federally-approved, state and tribal water quality standards under the significant cause of habitat degradation and reduced fish production."

"In Oregon and Washington most waterbodies, and in Idaho many waterbodies, on the 303(d) lists do not meet water quality standards for temperature."⁹⁴

Figure 2-6 shows rivers and streams with water quality concerns. Reservoir sediments can contain mercury and other hazardous substances. The effect of reservoir operations on sediment mobility and subsequent movements of hazardous substances has been a concern.

In addition to the human activities directly affecting the rivers, potential rapid increases in greenhouse gases and related ocean warming are issues of concern. Fish may be unable to adapt rapidly, which may in turn be contributing substantially to their drastically reduced ocean survival. One of the main biological impacts occurs because fish are cold-blooded, and their metabolism is a function of water temperature. If the water warms and food supply does not increase, their growth will decrease. This may be at least part of the reason that the growth of most of the salmon stocks studied has decreased over time⁹⁵, a factor that directly affects the number of eggs and the viability of the eggs.

The 20th century is the warmest century in the past 1,000 years. The 1990s are the warmest decade, and 1998 was the warmest year (1997 was the second warmest).⁹⁶ However, the rapid changes in warming in this century relative to the previous nine centuries are trivial, compared to the astonishing changes that global warming models project for the near future. Global warming models indicate that each coming decade may successively add nearly as much warming as the entire 20th century. Because the events currently taking place are outside of the evolutionary experience of salmonid populations, they are going to be ill-adapted to climatic conditions that have not been experienced in over a thousand years. Thus, the effects of human-caused climate change

⁹³ Federal Caucus (1999b), p. 2.

⁹⁴ Federal Caucus (1999b), p. 28.

⁹⁵ Bigler, BS; Welch, DW; Helle, JH, (1996): A review of size trends among north Pacific salmon (*Oncorhynchus spp.*). Can. J. Fish. Aquat. Sci. 53, 455-465

⁹⁶ Material in the next three paragraphs is drawn from the following sources: Welsh, D.W., Global Warming and Contemporary Fisheries Management, American Fisheries Society (in press), pp. 1 – 5; Welch, D.W., Whitney, F., Bertram, D., Harfenist, A., and Tucker, S., Ocean Climate Change and Growth and Survival of Pacific Salmon & Seabirds on the West Coast of North America, PICES VIII Conference, Russia (1999), p.2; Welch, D.W., Testimony to the Committee on Energy & Natural Resources, United States Senate, G. Smith hearing (1999), pp. 3-7; Welch, D.W., Unified Plan Working Paper on the Effects of the Ocean and Climate on Salmon Recovery and Their Importance to Planning and Decision Processes (in press), pp. 4, 15.

on salmonid populations, already clearly sensitive to climatic variation within our historical baseline, will be both unpredictable and large.

Changes in marine survival appear to be related to these sudden shifts in the climate of the ocean and atmosphere. Open ocean salmon research conducted from 1990-1995 indicates that salmon are headed for great difficulty in the long term because of global warming. On the West Coast, there have already been significant reductions in marine survival stretching from Oregon to Alaska, with the greatest losses occurring in southern regions. Oregon coho and Keogh River steelhead experienced a large drop in ocean survival during the 1990s. These rivers have no hydro system operation impacts, and the Keogh River is considered pristine, with no known changes in freshwater habitat. The ocean survival of Oregon coho salmon has decreased in the 1990s to one-tenth of the survival experienced in the 1960s. Thus, the changes in ocean habitat are now returning only one adult for every ten that would have returned in earlier, more productive, times. In British Columbia, many southern stocks of coho, chinook, and steelhead have also seen ocean survival decrease sharply since 1990, bringing some stocks to the verge of extinction in less than a decade. In addition, recent changes in the ocean survival of Alaskan salmon have sharply reduced catch levels. In each region, the primary cause of the sharp declines has been changes in ocean survival. These changes in marine survival are very alarming. They have occurred extremely swiftly, and have rapidly made formerly healthy populations unsustainable—even with the termination of all fisheries.

Projected global warming is sufficient to move the temperature limits that determine where some species of salmon feed entirely out of the Pacific Ocean and well up into the Bering Sea. If this occurs, then within our lifetimes, several species of Pacific salmon would no longer be able to forage successfully in the Pacific Ocean. In at least some stocks, recent changes in ocean survival are much larger than changes in freshwater survival. If the ocean habitat continues to deteriorate as over the last two to three decades, then threatened salmon populations may become unsustainable despite concerted efforts to restore or improve freshwater habitat. Climatic changes anywhere near projected levels may prevent fisheries scientists from being able to effectively provide credible assessment and management advice in a sufficiently timely manner to prevent major fishery collapses. Simply put, the changes will be beyond our ability to manage. For more information on Global Warming and Ocean Conditions, please see **Appendix F**.

2.4.1.3 Fish and Other Aquatic Resources

Many aquatic species are substantially diminished in numbers relative to historical levels.

“Native salmon and steelhead, and many resident fish species are in decline throughout the Columbia River Basin. Recent analyses indicate that extinction risks for Snake River salmon and steelhead populations are significant. The National Marine Fisheries Service (NMFS) has listed 12 Columbia River Basin salmon and

steelhead Evolutionarily Significant Units (ESU) as threatened or endangered under the Endangered Species Act (ESA).⁹⁷

The problems extend to many of the region's resident fish:

"(M)any resident fish species are in decline throughout the Columbia River Basin. Bull trout have been listed as threatened and Kootenai River white sturgeon have been listed as endangered by the USFWS under the ESA."

Figure 2-7 shows the areas where species have been listed as threatened or endangered.

Aquatic conditions in the mainstem have been substantially altered by reservoirs.

"These impoundments have inundated large amounts of spawning and rearing habitat...Current mainstem production areas for fall chinook are mainly confined to the Hanford Reach of the Columbia River and to the Hells Canyon Reach of the Snake River, with minor spawning in the mid-Columbia, below the lower Snake River dams, and below Bonneville Dam. Hanford Reach is the only known mainstem spawning area for steelhead. Chum salmon habitat in the Lower Columbia has also been inundated. The mainstem habitats of Columbia, Snake and Willamette rivers have been reduced, for the most part, to a single channel, floodplains have been reduced, off-channel habitat features have been lost or disconnected from the main channel, and the amount of large woody debris (large snags/log structures) in rivers has been reduced. Most of the remaining habitats are affected by flow fluctuations associated with reservoir management."⁹⁸

The presence of the dams can also cause increased dissolved nitrogen gas from voluntary and involuntary spills and alter natural temperature patterns that are important for fish habitat and migration.

Storage of water for winter hydropower generation and spring flood control has substantially altered the natural runoff pattern by increasing fall and winter flows and decreasing spring and summer flows.⁹⁹

Reservoirs are characterized by wider cross-sectional areas than free-flowing rivers, which result in lower water velocity for any given flow level when compared to the unimpounded river. This wider cross-section, coupled with the storage of water within a year, reduces water velocities, particularly during periods when most juvenile salmonids outmigrate.¹⁰⁰

⁹⁷ Federal Caucus (1999b), p. 1

⁹⁸ Federal Caucus (1999b), p. 29.

⁹⁹ Federal Caucus (1999b), p. 67.

¹⁰⁰ Federal Caucus (1999b), p. 67.

"These conditions increase the travel time of juveniles and adults. Increased travel time exposes juveniles to predators and alters the timing of their ocean entry. The reservoirs have also substantially modified the temperature of the river and provide ideal habitat for salmon predators."¹⁰¹

Juvenile transportation is used to assist out-migrants, but its overall success in terms of returning adults is unclear.

Evaluations of transportation conducted over the past 25 years have shown that in nearly all studies, return (juveniles surviving to return as adults) rates are higher for transported fish than those that migrated in-river Nevertheless, overall smolt to adult returns (SARs) are still generally lower than they were prior to completion of the Lower Snake River Dams and John Day Dam on the Lower Columbia River. This has led some to conclude that juvenile fish transportation is ineffective.... Overall, direct survival of transported migrants is high, estimated at greater than 98%. Behavior and survival of transported fish following release below Bonneville Dam is similar to that of in-river migrants. Some people believe that indirect mortality of transported fish is high (i.e., many of the fish that survived during transportation die later; delayed transportation mortality), but this is a subject of ongoing research.¹⁰²

Riparian and aquatic ecosystems continue to experience competing developmental interests, associated disturbances, and unsustainable resource extraction. Logging, grazing, mining, water diversions, dams, and other human activities have at least moderately if not severely degraded most riparian ecosystems in the Pacific Northwest. The following list is indicative of the decline in the health of riparian ecosystems:

- Forestry, agriculture, mining, and urbanization have altered or destroyed tributary habitat. Many riparian areas, flood plains and wetlands that once stored water during periods of high runoff have been developed.
- Of the streams surveyed in Oregon in 1988, 95% were determined to be moderately or severely degraded because of excessive sedimentation, high water temperatures, bank instability, or other problems with water quality related primarily to logging and removal of large woody debris from stream channels.
- Of the 3.4% of Washington State's waters that have been surveyed, 58.5% have been identified by the Washington Department of Ecology as impaired.¹⁰³
- Pursuant to Section 303(d) of the federal CWA, 7,994 stream miles and 228,277 lake acres in Idaho have been listed as impaired.¹⁰⁴
- Agricultural development, channelization, and diking to control flooding along the Willamette River have drastically simplified the once braided system of

¹⁰¹ Federal Caucus (1999b), p. 67.

¹⁰² Federal Caucus (1999b), Hydro Appendix, p. 11.

¹⁰³ WDOE (1998).

¹⁰⁴ EPA (1998).

oxbows, small side channels, ponds, and sloughs that supported extensive marshlands and riparian forests.

- The widespread removal of large woody debris from streams, lack of recruitment of new woody debris, and increased sedimentation from logging and other land uses have reduced the structural diversity of instream habitats (for example, the large, deep pools that are essential components of high-quality fish habitat) for fishes and other aquatic organisms in many of the region's streams.
- A long history of mining, logging, and grazing has badly degraded substantial portions of forested eastside river systems such as the John Day, Grande Ronde, Yakima, Wenatchee, Entiat, and Methow rivers. Mining may have deposited new hazardous substances, or disturbed naturally occurring hazardous substances, in floodplain sediments.
- Riparian cottonwood forests in Idaho are no longer self-sustaining because dams have eliminated the spring flooding that exposed the mineral soil needed for seed germination.¹⁰⁵

Estuarine conditions have also been substantially affected by development.

"More than 50% of the original marshes and spruce swamps in the estuary have been converted to industrial, transportation, recreation, agricultural or urban uses. More than 3,000 acres of inter-tidal marsh and spruce swamps in the estuary have been converted to other uses since 1948.¹⁰⁶ Many wetlands along the shore in the upper reaches of the estuary have been converted to industrial and agricultural lands after levees and dikes were constructed. Dam construction and operation up-stream of the estuary has changed the seasonal patterns and volumes of discharge into the estuary. The peaks of spring-summer floods have been reduced and the amount of water discharged in winter has been increased.

In the main channel in the estuary, the Corps dredges and maintains the shipping channel and is proposing a navigation channel-deepening project. There are potential substantial adverse effects resulting from this action, for example the creation of dredge spoils islands where Caspian terns and other birds nest. These birds prey on juvenile salmon. NMFS and USFWS are presently in consultation with the Corps on the navigation channel dredging. The goal of consultation is to substantially reduce these effects immediately."¹⁰⁷

The overall contribution of hatcheries to fish numbers in the basin has been positive, but the effect of hatcheries on wild stocks and genetic diversity is a concern.

Hatcheries have a long history of providing fish in an efficient manner for harvest and related social purposes. Artificial production represents 70-90% of the run for some species (coho, spring, fall chinook, steelhead). It is not yet clear, however, whether hatcheries are effective in rebuilding self-sustaining, naturally spawning

¹⁰⁵ Federal Caucus (1999b).

¹⁰⁶ Lower Columbia River Estuary Program (1999).

¹⁰⁷ Federal Caucus (1999b), p. 30.

populations over the long term. A fundamental question is: how can artificial production be applied in a manner that not only avoids harm, but also assists in the conservation and rebuilding of wild runs?¹⁰⁸

Hatcheries have introduced inbreeding and competition, may have been a source of disease for wild fish, and have in some cases induced fisheries to harvest at rates too high for natural stocks. Species of plant or animal [are] in danger of extinction.¹⁰⁹

Figure 2-8 shows the hatcheries and the areas where they have been used to help to increase the number of fish. For more information on anadromous and resident fish hatchery facilities, please see **Appendix G**.

Fish harvest contributes directly to mortality of most stocks, and some fish are killed incidental to take of more common species or stocks.

“Fishing, or harvest, has reduced the number of adult fish that return to spawn.”¹¹⁰

In addition, introduced aquatic species have significantly and rapidly altered the population dynamics of native fish communities. In the Pacific Northwest, freshwater fish communities are relatively sparse in terms of the numbers of species and families, compared to other parts of the country. For example, Tennessee has about 400 native species of freshwater fishes, while Oregon has fewer than 70 and Washington less than 50. In the Columbia River, introduced species account for more than 35% of the 80 species of fish. In less than a century, introductions have increased the species richness of fishes in the Pacific Northwest by one-third, from what they were during the previous 10,000 – 12,000 years.¹¹¹

2.4.1.4 Land Use and Quality

Land use in the region has changed dramatically in the last 150 years. Forests have been cut, grasslands, forestlands and wetlands converted to grazing and agriculture, and land has been converted to developed uses. Table 2.4-1 shows recent land use by ecological province as defined by the Multi-species Framework Process.¹¹²

¹⁰⁸ Federal Caucus (1999b), p. 5.

¹⁰⁹ Federal Caucus (1999b), p. 1.

¹¹⁰ Federal Caucus (1999b), p. 1.

¹¹¹ Palmisano, J.F, *Pacific Salmon: A More Thorough List of the Natural and Human-Induced Factors of Decline* (2000), July 27, 2000 memo.

¹¹² Ecological provinces are groupings of adjoining subbasins with similar climates and geology to account for distinct environments for fish and wildlife populations (Council, 2000, p. 46).

Table 2.4-1: Recent Land Use of Columbia Basin Lands in the United States by Ecological Province, 1000 Acres Total and Percent by Use

Province	1000 Acres Total	Agri-cultural	Forest	Range-lands	Urban	Water and Wetland
Lower Columbia	11,265	16.9%	74.3%	0.9%	5.4%	2.5%
Columbia Gorge	1,234	18.9%	71.1%	4.8%	1.3%	4.0%
Columbia Plateau	30,136	30.9%	35.8%	30.7%	0.9%	1.7%
Cascade Columbia	4,744	3.9%	71.2%	19.4%	0.4%	5.1%
Blue Mountains	5,014	21.3%	48.6%	28.2%	0.4%	1.4%
Mountain Snake	14,946	6.7%	70.5%	19.8%	0.2%	2.9%
Inter-mountain	5,417	16.9%	70.5%	8.2%	2.2%	2.3%
Middle Snake	20,059	8.3%	26.5%	62.6%	0.6%	2.0%
Upper Snake	23,372	19.2%	13.4%	61.3%	0.7%	5.3%
Mountain Columbia	21,542	5.2%	76.8%	10.2%	0.6%	7.0%
Total	137,729	15.9%	47.3%	32.1%	1.1%	3.5%

Source: Council 2000a: Human Effects Analysis of the Multi-Species Framework Alternatives, 2000

Soils west of the Cascades are generally deep residual or glacial deposits interspersed with rich alluvial stream bottoms.¹¹³ East of the Cascades, river valleys and lower terraces are predominantly young alluvial soils. Uplands tend to have a thin covering of highly erodible wind-blown soils. In the Rocky Mountain portion of the basin, valley floors are predominantly glacial, outwash and alluvium, and upland soils tend to be rocky, coarse and permeable.

The ICBEMP Draft EIS identifies the current condition of BLM and FS lands east of the cascades:

“Soil productivity is generally stable to declining. . . sustainability of soil ecosystem function and process is at risk. . . in some areas.”¹¹⁴

Soil productivity decreases due to loss of nutrients and organic matter. Such losses are often caused by exposure of soil to wind and water. Exposure can be caused by agriculture, grazing, trampling, vehicle traffic, and a variety of other human activities.

Urbanization of lands causes a loss of the native land characteristics. Urbanized and agricultural land, depending on its management, can provide habitat values for some native species.

“Urbanization paves over or compacts soil, and increases the amount of runoff reaching rivers and streams.”¹¹⁵

See Figure 2-9 for a map of the different types of vegetation across the region.

¹¹³ USDOE/BPA (1995b).

¹¹⁴ USDA/USDI (1997), pp. 18-19.

¹¹⁵ Federal Caucus (1999b), p. 29.

2.4.1.5 Wildlife and Other Terrestrial Resources

The ICBEMP Draft and Supplemental Draft EIS identifies the current condition of forests, grazing lands, and wildlife east of the Cascades. Many of these statements are representative for other areas of the basin as well.

- “Interior ponderosa pine has decreased across its range. . . There has been a loss of the large tree component Generally, mid-aged forest structures have increased”
- Increased fragmentation and loss of connectivity within and between blocks of habitat . . . have isolated some habitats and populations. . . . Fragmentation has isolated some animal and plant habitats and populations and reduced the ability of populations to disperse.”
- “Rangeland noxious weeds are spreading rapidly. . . .infestations have simplified species composition, reduced diversityWoody species encroachment. . . have reduced biodiversity.”
- Declines in plant and animal terrestrial species are due to a number of human causes including conversion of habitat to agriculture and urban development, grazing, timber harvest, introduction of exotic plant and animal species, recreation, high road densities, fire exclusion, and mining.”

In coniferous forests, logging has greatly reduced late-successional forest structures. Populations of associated wildlife species have correspondingly declined. Both late-successional and younger forests provide habitat for large animals such as mule deer, cougar, bear, and elk.¹¹⁶ See Figure 2-10 for a map of sightings for the listed threatened and endangered wildlife.

2.4.2 Socioeconomic Environment

This section describes the existing socioeconomic environment, including cultural, social, aesthetic, historical and health-related factors.

The Columbia River Basin includes most of the states of Washington, Oregon, and Idaho and parts of Montana, Wyoming, Nevada and Utah. Approximately 8 million people lived in the region in 1980; by 2015, this figure is expected to grow to about 12 million. The region has recently experienced rapid population growth in comparison to the nation as a whole, and this is expected to continue. The recession during the 1980s contributed to outward migration; however, enhanced economic prospects for the region have reversed this trend and more people are moving into the region. As of 1999, the Basin was continuing to experience rapid growth, with many small rural communities (including Native American communities) undergoing significant social and economic changes. Please see Chapter 7 for a discussion of a related socioeconomic issue, Environmental Justice.

¹¹⁶ USDOE/BPA (1997b), p. 43.

This immigration is expected to continue as comparatively strong economic growth, increases in retirement, and recreation development help foster population growth above United States averages. The growth at the regional and basin levels is not shared equally among all communities and industries. See Figure 2-11 for a map showing the population distribution across the different counties within the region.

Only a few decades ago, economic growth was fueled by natural resources industries such as agriculture, fishing, mining and forestry, and inexpensive hydropower was important in attracting energy-intensive industries. Now, economic growth is spurred primarily by growth in services, government, and technology. The region's natural location on the Pacific Rim and its relative proximity to Asian markets provides a continuing advantage that has also influenced present-day economic development.¹¹⁷

The region's economic base is strengthened by the advantage of low-cost energy. The availability of natural gas from Canada and the region's hydro base for electricity gives the Pacific Northwest a long-term energy advantage. However, even this advantage means less to most people, as the economy becomes more service-oriented.

Many rural areas are located away from a well-developed infrastructure, face serious periodic economic downturns, and pose significant challenges for economic and social policy. Rural areas have lost economic base because of resource depletion, environmental laws, and changes in international markets and technology. The rural way-of-life became the focus of intense public debate as timber-dependent communities suffered job losses in the traditional lumber and wood products industries. Rural areas also experienced declines in the agriculture and food processing industries caused by efficiency and productivity gains.

With declines in rural areas and expanding urban economies, the disparity in earnings and unemployment rates between urban and rural areas has increased. Still, the natural resource industries play important roles in the region's economy. They provide relatively stable jobs in rural areas, they create jobs in transportation, forward processing and related industries, and they contribute to foreign exchange earnings.

These changes have reduced the relative economic and political power of the natural resource industries. In general, the regional economy has evolved a more diverse base, with notable growth in technology, transportation, trade, and service sectors. This, plus improved efficiency in regional industries, has made the region more resistant to the severe economic fluctuations experienced in the past, and fewer persons need to rely on natural resources for their livelihood. Overall, growth for major sectors of the regional economy is expected to be moderate.¹¹⁸

An increasingly urban population is increasing demands for recreation and environmental quality. California, with over 30 million people, represents an important market for the

¹¹⁷ This paragraph paraphrased from USDOE/BPA (1995b), Appendix O - Sec. 2.1.1.

¹¹⁸ USDOE/BPA (1995b), Appendix O, p. 2-8.

Pacific Northwest. The tourism industry, fueled by outdoor recreation and scenic opportunities, provides economic stimulus in less populated regions and creates economic activity in the service and trade sectors. All of these factors increase the relative importance of recreational use, quality of life and preservation relative to resource extraction. At the same time, development is threatening the qualities that make rural places attractive for recreation, retirement, and new businesses.

The urban and rural areas are closely linked in the Pacific Northwest. Today, some parts of the region—especially larger urban areas—are experiencing problems with congested roads, overburdened infrastructure, and concerns about air and water quality. Many of the region's residents value the quality of life afforded by smaller cities, clean air and water, outdoor activities and open spaces. Increasingly, more people are leaving the traditional suburbs for homes in more rural areas. Sustaining the environment and managing the effects of a quickly growing population have become important to many.

Table 2.4-2 (following page) shows data on population, value of output, income and employment for the nation and for each of the four states with an important share of their economic activity in the basin.

The following discussion for this section of the existing socioeconomic environment is described by these categories:

- Tribal Conditions,
- Commerce,
- Social and Cultural, and
- BPA Projects and Funding.

2.4.2.1 Tribal Conditions

The federally recognized Indian tribes of the Columbia River Basin encompass many different cultures, habits, geographic locations, and relationships to natural resources. While there are over 50 tribes in BPA's service area, we focus on the 13¹¹⁹ in the Basin where we are required to take mitigation and recovery actions for the FCRPS. The Columbia River tribes that have adjudicated fishing rights include the Confederated Tribes of the Warm Springs Reservation, the Yakama Indian Nation, the Confederated Tribes of the Umatilla Reservation, and the Nez Perce Tribe. Other federally recognized tribes in the region also have fishing and hunting rights. These tribes include the Burns Paiute, Coeur d'Alene, Duck Valley, Flathead, Shoshone-Bannock, Shoshone-Paiute, Kalispell, Kootenai of Idaho, and Spokane. The two newly federally recognized tribes are the Chinook Indian Tribe/Chinook Nation and the Cowlitz Indian Tribe. Figure 2-12 shows a map of the Indian Reservation lands and other land ownership in the region today. Table 2.4-3 provides data on the federally recognized tribes in the region.

¹¹⁹ Now a total of 15 tribes: the Chinook Indian Tribe/Chinook Nation and the Cowlitz Tribe have recently been federally recognized, but are not yet active in mitigation efforts. The 50 tribes are named in **Appendix B: Mission Statements and Statutory Tables**.

The tribes exercise sovereign governmental authority over tribal members and land on their respective reservations. Northwest Indians also hold and exercise rights to important activities and resources in areas beyond their respective reservation boundaries. These off-reservation rights typically include fishing, hunting, gathering activities, and use of sacred and religious sites. Some of the tribes have recently exerted strong leadership roles in natural resource preservation and management, as well as in the protection of cultural resources.

Despite some differences in language and cultural practices, many of the regional tribes share the history of a subsistence economy based on salmon. However, due to the demise of salmon, there has been a dramatic decline in the amount of salmon harvested and consumed by tribal peoples over the last century. The loss of salmon has altered traditional tribal economies, and reduced wealth, health and well-being. Today, to the relatively limited extent the resource permits, tribal people continue to fish for ceremonial, subsistence, and commercial purposes employing—as they always have—a variety of technologies. Tribal members fish from wooden scaffolds and from boats; they use set nets, spears, dip nets, and poles and lines. The tribes still maintain a dietary preference for salmon, and its role in ceremonial life remains preeminent. Salmon are important and necessary for physical health and for spiritual well-being. Today, perhaps even more than in the past, the Columbia River treaty tribes are brought together by the struggle to save their fishing rights and by shared spiritual traditions such as the first salmon feast.

Some other tribes in the basin have somewhat different priorities. Some “upriver” tribes today have less of an interest in salmon than they once did, perhaps because of the loss of fish and wildlife brought about by a number of contributing factors, including those such as population growth, urbanization, and the construction of the dams. Some tribes also have re-directed their interests to other economic enterprises such as irrigation or recreation development in the reservoirs behind dams. An issue faced by the tribes concerns downriver operations for salmon that can be harmful to upriver resident fish species, recreation or irrigation and, therefore, the interests of the upriver tribes.

Socioeconomic conditions for tribal members are not on par with their non-Indian neighbors. Table 2.4-3 (following Table 2.4-2) shows poverty rates, unemployment rates, per capita income and mortality rates for the four states and selected tribes in the Columbia Basin.

Table 2.4-2: Summary of Socioeconomic Measures for the United States, and by State`

Measure	Year, Units	United States	Washington	Oregon	Idaho	Montana
Population	1997, thousands	267,636	5,610	3,243	1,210	879
Gross Regional Product	1996, billion dollars	\$7,631.0	\$159.6	\$87.0	\$27.9	\$18.5
Employment	1996, employed civilian labor force	126,708	2,699	1,619	587	423
Unemployment Rate	1996, % of civilian labor force	5.40%	6.50%	5.90%	5.20%	5.30%
Income	1997, billion dollars	\$6,851.0	\$149.9	\$79.1	\$24.8	\$17.6
Income per Capita	1997, dollars per person	\$25,598	\$26,718	\$24,393	\$20,478	\$20,046

Full-time and Part-time Employment Shares by Industry: 1996						
	Farm, Agricultural Services, Forestry, Fishing	3.2%	4.3%	5.4%	8.0%	6.9%
	Mining	0.6%	0.2%	0.2%	0.6%	1.4%
	Construction	5.4%	5.7%	6.0%	7.7%	6.5%
	Manufacturing	12.9%	11.7%	13.6%	12.2%	5.9%
	Transportation and Public Utilities	4.8%	4.5%	4.6%	4.5%	5.1%
	Wholesale Trade	4.7%	5.0%	5.2%	4.8%	4.0%
	Retail Trade	17.2%	17.6%	18.3%	18.9%	20.6%
	Finance, Insurance, Real Estate	7.5%	7.4%	6.6%	5.6%	6.3%
	Services	31.0%	29.5%	30.2%	27.1%	31.6%
	Government	14.5%	16.6%	13.4%	16.0%	16.8%

Source: Council (2000a), Human Effects Analysis of the Multi-Species Framework Alternatives, Appendix A.

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Table 2.4-3: Poverty Rates, Unemployment Rates, Per Capita Income and Mortality Rates for All Citizens and Tribal Citizens of the Columbia Basin

States/Tribes	Poverty (Percent)	Unemployment ¹ (Percent)	Per Capita Income ²	Rate of Death (per 100,000 population)	Ratio of Tribal Death Rate to State Death Rate
Washington	10.9	5.7	\$13,400	477.1	
Yakama	42.8	23.4	\$5,700	965.8	2.0
Colville	28.9	20.2	\$8,000	823.5	1.7
Spokane	33.0	17.3	\$7,800	557.0	1.2
Kalispel	31.4	13.5	\$7,800		
Oregon	12.4	6.2	\$14,900	487.2	
Umatilla	26.9	20.4	\$7,900	491.1	1.0
Warm Springs	32.7	19.3	\$4,300	721.4	1.5
Burns Paiute	42.8	50.0	\$4,600	*	*
Idaho	9.7	6.1	\$11,500	440.4	
Kootenai	28.1	30.3	\$8,300	**	**
Coeur d'Alene	27.7	17.8	\$6,100	519.6	1.2
Nez Perce	29.4	19.8	\$8,700	628.0	1.4
Shoshone-Bannock	43.8	26.5	\$4,600	1,033.7	2.3
Shoshone-Paiute ³	44.2	25.2	\$5,200	***	***
Montana	16.1	--	\$11,200		
Flathead Salish and Kootenai	27.4	16.4	\$8,800		

¹ In winter, tribal unemployment can reach 80%.

² Includes Duck Valley Sho-pai in Nevada.

³ . Census data is before income taxes, after transfers

*Data included in Warm Springs Indian Health Service Unit.

** Data included in Indian Health Service Unit serving Nez Perce.

*** Data not separately available.

Note: This table includes data on the 13 Federally recognized tribes, as of Fall 2000.

Sources: Council, 2000a: Human Effects Analysis, 2000, as summarized from U.S. Bureau of the Census, 1990, Portland Area Indian Health Service, 1994. American Indian and Alaska Native Mortality: Idaho, Oregon and Washington, 1989-1991, Census of Population Social and Economic Characteristics American Indian and Alaska Native Areas. 1990 CP-2-1A”

2.4.2.2 Commerce

This section describes existing conditions in the regional economy for industries that might be affected by the Policy Directions. The term “industry” is meant to include many groups of people having a close relationship to the industry such as owners, workers, consumers, people who sell to the industry, and associated regional economies and communities.

Power

Hydroelectric power accounts for about 75% of the region's electricity supply. The system of 30 federal projects in the basin has an installed capacity of about 19,600 MW. Fourteen federal projects account for 18,900 MW, or two-third of the region's hydroelectric capacity in 1995.¹²⁰ Figure 2-13 and **Appendix E** shows the major hydro sites in the region.

BPA markets and distributes power generated by the Corps and Reclamation at federal projects in the basin. Customers include public and private utilities, industrial customers, and users outside the region. The regional transmission system, which includes about 15,000 circuit miles, is interconnected to Canada, California and Utah. These interties take advantage of differences in power costs and timing of demand between regions. Figure 2-14 shows BPA's major high-voltage electrical transmission system.

BPA sells firm power contracts to deliver power over a future defined period. As of 1995, BPA had long-term firm power sales contracts with over 120 utilities, including municipalities, public utility districts, and rural cooperatives. The region's publicly owned utilities have a first call, or “preference” for federal power. Firm power contracts are also held by federal agencies and industries. Nonfirm energy is generally sold with no guarantee of availability and deliveries can be curtailed on short notice.

Recently, electricity demand has increased faster than supply in the Western United States. Demand has increased with population growth and adoption of computer technologies, but supply development has been constrained by environmental regulations and uncertainty about market structure and prices. As a consequence, regional power generation capacity is less able to meet demand in peak demand periods, and more frequent shortages appear likely in the future. Rolling blackouts have occurred in California. The responsibilities of the FCRPS in exporting electricity and in protecting fish and wildlife came into sharp conflict during the summer of 2000, when fish spill was decreased to generate more power for export.

In addition, as of winter 2000 – 2001, natural gas prices reached record levels. These events have increased the value of hydropower generation significantly. Electricity spot prices have reached unprecedented levels, and California's electricity market deregulation faces close scrutiny by federal and state regulators. Electricity prices are likely to remain high, and shortages more frequent, until new generation capacity is

¹²⁰ USDOE/BPA (1995b), p. 3-23.

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developed at a rate that meets or exceeds demand growth. Natural gas consumption by power plants is expected to more than double in the region by 2010.¹²¹

This situation has continued to deteriorate. The winter of 2000-2001 has been one of the driest on record since 1929. A lack of water supply has forced federal agencies to transport up to 90% of Snake River migrants, and the agencies may be unable to provide normal system benefits for users at least through 2001. For BPA, this situation means that it will be more difficult to provide low-cost power and protect fish and wildlife as in normal years.

Available transmission capability allows exchange of power between areas that have surpluses. If this transmission capability is reduced, less power can be transferred between the areas and the areas cannot take advantage of these surpluses. This will tend to increase the cost of power throughout the region.

If new generation were built to replace dams that are breached, additional transmission facilities would be needed to connect the generation to the system. Depending upon the location of the new generation, new transmission reinforcements are often needed to move this new generation to the load areas. With careful placement of these new generators, transmission reinforcements can be deferred.

Transmission system maintenance is a critical component of maintaining capacity and reliability of the power grid. Changes in environmental policies can affect the way in which maintenance activities are performed and can increase the cost of providing transmission services.

Recreation

Outdoor recreation has become an important use of the federal hydroelectric system. The range of potentially affected activities includes sport fishing for anadromous and resident fish; flatwater recreation activities such as boating, waterskiing, and windsurfing; river recreation such as rafting, kayaking and canoeing; and land-based activities with ties to water such as touring, camping, sightseeing and hiking.

Recreation use is authorized at all of the federal projects. The Corps and Bureau are responsible for providing recreation facilities at their projects. Often, these agencies cooperate with state or local governments to provide recreation facilities such as swimming beaches, boat ramps, marinas, and campgrounds.

Reservoir recreation is generally concentrated in the summer months. Annual use at the four most downstream reservoirs was recently estimated to be about 10 million days annually, with usage of all federal reservoirs above McNary at about 8 million days

¹²¹ Energy Policy Division, State of Washington, Office of Trade & Economic Development, Natural Gas and Power in Washington: A survey of the Pacific Northwest natural gas industry on the eve of a new era in electric generation (April 2001), p. 14.

annually. Annual use at the four lower Snake dams is about 2 million days. Most visitors to the lower Snake reservoirs live close by.

Recreational fishing for salmon and other anadromous fish is an important economic activity in parts of the Pacific Northwest. Ocean sport fishing is a significant activity. The Pacific Fisheries Management Council has estimated personal income effects of ocean sport fishing in Oregon and Washington in 1993 to be around \$12.5 million annually, down from \$20 million or more in the 1980s due to recent harvest restrictions to protect weak stocks of coho and chinook salmon. Economic value of freshwater sport fishing for anadromous fish under the restrictive fisheries regulations of the early 1990s (compared with the 1970s-1980s) has been estimated to be about \$3 million annually. The value of sport harvest fluctuates according to the allowable catch, which is dictated by the abundance of fish runs and associated local harvest regulations.

National Forest lands in Idaho, Oregon, and Washington received, respectively, 15, 37 and 25 million visitor days in 1997.¹²² Outdoor recreation data for private lands are not available.

Commercial Fisheries

Potentially affected commercial fisheries are primarily salmon fisheries. Columbia River salmon are caught by ocean commercial net and troll fisheries from California to Alaska. The ocean fisheries catch salmon from many non-Columbia River stocks. The freshwater Columbia River commercial fishery is comprised of a non-Indian commercial gillnet fishery in the lower Columbia River (from the estuary to Bonneville Dam) and a treaty Indian fishery in the Columbia River above Bonneville Dam. The tribal fishery primarily uses set gillnets and dip nets to take salmon. As with the sport fishery, run size, catch and income vary from year to year, but gross annual value of the in-river fishery has been estimated to be about \$15 million. Total economic consequences (personal income including multiplier effects) of the Columbia River commercial fishery under early 1990s conditions has been estimated to be about \$33 million.¹²³ This amount is a small share of the personal income generated by all commercial fishing. Decreased fish abundance in recent years (and therefore declines in harvest) has reduced the present value of the commercial fishing industry.

Transportation

The Columbia-Snake Inland Waterway extends 465 miles through eight dams and locks from the Pacific Ocean to Lewiston, Idaho. The four lower Snake dams account for 140 miles of the waterway. This upper reach is maintained at a depth of 14 feet.

Commercial shallow-draft traffic on the Snake River is primarily by barge or tow boat. A few companies account for the majority of vessels operated, as well as the majority of traffic. Total annual shipments using any part of the Lower Snake system recently

¹²² USDA, Agricultural Statistics 2000 (2000), Table 12-38, Page XII-28

¹²³ Derived from information in Corps (1999a).

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weighed about 4 million tons. Upriver tonnage is about one-tenth the downriver amount. About three-quarters of the cargo is wheat and barley. Most of the remaining downriver traffic is forestry products, and most of the upriver cargo is petroleum products and chemicals. Rail and road transport would not be able to transport commodities as inexpensively as the existing water transportation system. The transportation savings have been estimated to range between \$24 - \$35 million annually.¹²⁴ Figure 2-15 shows the major barging routes, railroad tracks, and interstate and state highways in the region.

Agriculture and Forestry

Agriculture and forestry are important industries for the Columbia River region, but especially for many rural communities. Table 2.4-4 summarizes data on agricultural and forestry land use and agricultural income by state for the region.

Table 2.4-4: Data on Land Use and Agricultural Income by State

	Idaho	Montana	Oregon	Washington
Number of Farms, 1999	24,500	28,000	40,500	40,000
1992 Land Use, 1000 acres				
Cropland	4,799	13,941	3,720	6,500
Grassland pasture	20,219	47,364	22,456	7,590
Forestland	18,033	18,592	26,614	17,985
Irrigated Land, 1997, 1000 acres	3,494	1,994	1,949	1,705
Farm receipts, 1998, million \$				
Crop receipts	1,735	934	2,330	3,424
Livestock receipts	1,585	865	762	1,730
Government payments	196	357	100	257
Total receipts, million \$	3,320	1,799	3,091	5,154

Source: USDA Agricultural Statistics 2000

See also Figure 2-9 for a map of the general different general land uses across the region.

There are 7 to 9 million acres irrigated in the Columbia River basin in the United States, including irrigated land in non-agricultural uses. Important agricultural uses include alfalfa and other hay, wheat, corn, potatoes, peas, apples, grapes, a number of other crops, and irrigated pasture. Irrigation water use tends to be focused in areas with suitable land and climate. The share of Columbia Basin water diverted for irrigation is small (about 6%) but the share of water diverted from some sub-basins is much larger. Important irrigated areas include the Upper Snake River, the Columbia Basin Project, and irrigation from the Yakima, Willamette, Deschutes and John Day rivers.

Some irrigated areas depend on water levels in federal reservoirs for irrigation diversions or groundwater levels, especially near Ice Harbor, John Day and McNary reservoirs. About 37,000 acres are irrigated using surface water diverted from Ice Harbor. About

¹²⁴ Source: Corps (1999), Appendix I Economics, Table 8-1.

167,000 and 125,000 acres are irrigated from John Day and McNary reservoirs, respectively.

There are about 16 million acres of dry (non-irrigated) agricultural land in the basin.¹²⁵ Probably less than 10 million acres is normally planted to dryland crops at any point in time. Dryland crops are primarily small grains such as wheat or barley, beans, and some hay. Value of production per acre is typically half or less of irrigated values. Dryland crops are scattered throughout the basin with notable concentrations in eastern Washington and Oregon and the Snake River plain.

The Human Effects Analysis reported that there are almost 45 million acres of rangelands in the basin, of which about 25 million acres are federal lands. Additional grazing occurs on forestlands. Most federal rangelands are managed by BLM and the USFS, with some grazing use on Indian reservations. Most grazing use is for cattle, although sheep and horses are also important products. Management and characteristics of the federal grazing lands in the basin east of the Cascades are described in detail in the ICBEMP Supplemental Draft EIS.¹²⁶

There are about 65 million acres of forestlands in the basin, of which 42 million acres are federal. Most federal forestlands are managed by the USFS, although significant lands are managed by BLM, NPS, and other federal agencies. Management and characteristics of the federal forestlands in the basin east of the Cascades are described in detail in the ICBEMP Supplemental Draft EIS (2000). Timber harvest on federal forestlands has declined in recent years. Currently, most timber harvest is occurring on private forest lands. See Figure 2-12 for the different land ownership across the region.

Residential and Commercial Development

Residential and commercial development are important economic activities in the basin. Table 2.4-5 summarizes some data on value of construction, and home construction and sales in the region.

Table 2.4-5: Data on Value of Construction, Housing Units and Existing Home Sales by State

	Idaho	Montana	Oregon	Washington
Construction Contracts, million \$, 1998	2,015	935	5,046	8,431
1000s Private Housing Units Authorized, 1998	11.7	2.6	25.9	45.7
Existing home sales, 1000s, 1998	29.7	18.3	63.1	159.2

Source: USDC, Statistical Abstract of the United States, 1999

¹²⁵ Land use information is from Council (2000a): Human Effects Analysis of the Multi-species Framework Alternatives (March 2000).

¹²⁶ USDA/USFS and USDO/BLM (2000).

There are about 1.5 million acres of urban lands in the basin. Almost half of this amount (600,000 acres) is concentrated in the Lower Columbia region. See Figure 2-11, which shows the counties by distribution of population.

2.4.2.3 Social and Cultural

Social resources are the established patterns of human relations that could be affected by the Policy Directions. These patterns include formal and informal institutions, communities, and families. Social resources are described in the environmental documents incorporated by reference.

Among the many changes occurring around the region regarding fish and wildlife, perhaps none is more deeply or emotionally expressed than the pressure on cultural values. The cultural values most likely to be affected by the Policy Directions are tribal values, rural values in communities dependent on salmon fisheries, agriculture or forestry, and environmental values. Physical cultural resources include archeological and historical sites throughout the basin. These sites are best described in the environmental documentation incorporated by reference.

Aesthetics

Aesthetics, the quality of a sensual experience, is a value judgment: an attribute that someone finds aesthetically pleasing may be displeasing to someone else. Many people value undisturbed land, air, and water as an aesthetic value. Others prefer developed land. In environmental documents, effects on aesthetics are commonly described for value judgments (such as clean air and water and healthy ecosystems) that are held in common by many or most persons.

The Pacific Northwest Region is world-renowned for its aesthetic resources. Potentially affected aesthetic resources include all of the land, water, and biological resources previously discussed, but with reference to their impression on aesthetic values rather than their economic or ecological functions. Effects of reservoir drawdown on exposed reservoir bottoms and the appearance of reservoir bottoms are an issue.

2.4.2.4 BPA Projects and Funding

BPA funds fish and wildlife projects with funds provided by ratepayers. Currently, BPA's revenues make up a substantial portion of one of the largest and most expensive fish and wildlife mitigation and recovery efforts in the United States. Since the enactment of the Regional Act in 1980, BPA has spent billions of dollars on this effort and continues that spending today. For fiscal years 1996 through 2000, BPA spent over \$200 million on average for direct fish and wildlife program costs, reimbursable expenses paid to the Treasury for other federal agencies' operation and maintenance of fish hatchery and passage facilities, and debt service on capital investments such as bypass facilities and hatcheries.¹²⁷ From 2001 through 2006, BPA projects spending on average over \$300 million, with the integration of the 2000 Biological Opinions to address the

¹²⁷ BPA (1998).

ESA compliance requirements increasing the amount to over \$350 million.¹²⁸ Even as large as this amount seems, it does not include any costs for changes in operations.

While it is difficult to measure the results scientifically, BPA has achieved a considerable progress through its mitigation and recovery effort actions.

- *Implementing the Council's Columbia River Basin Fish and Wildlife Program directed at protection, mitigation, and enhancement of fish and wildlife affected by the construction and operation of the federal hydrosystem.*
- *Funding of those activities under ESA specified in the NMFS and USFWS Biological Opinions, and research, monitoring, evaluation, education, and enforcement actions.*
- *Funding of hatcheries requested, planned, and operated by those Columbia River tribes possessing treaty fishing rights; and fisheries improvement projects for the remaining tribes in the Basin.*
- *Fish and wildlife projects protecting over 500,000 acres of habitat.*
- *Fishing net replacement programs to allow tribal fishers to catch more fish from strong stocks in mixed stock fisheries.*
- *Conservation hatcheries, including captive broodstock facilities, to maintain species on the brink of extinction.*
- *Funding the power share of the Corps' Columbia River Fish Management Program and in-lieu fishing sites.*
- *Direct funding of the Lower Snake River Compensation Plan hatchery and evaluation program.*
- *Adopting funding principles in rate setting processes to ensure adequate funds are available for mitigation projects.*

To date, BPA has funded over 1,500 fish and wildlife mitigation and recovery effort projects.

Figure 2-13 shows where BPA has done or is doing fish and wildlife projects for the recovery effort in the region. Please see **Appendix H** for a detailed list of BPA fish and wildlife projects.

- ➡ **Chapter 3 describes and compares the alternative Policy Directions assembled from the many regional ideas and processes currently working to address the uncoordinated and inefficient Status Quo Policy Direction.**

¹²⁸ BPA, Rate Case and 2000 Biological Opinion Projection, S. Cooper (Dec. 18, 2000).

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